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ABSTRACT

This document reports on the technical and programmatic planning stages of the Satellite Instructional Television Experiment (SITE), which was undertaken by India in 1975-76 utilizing the first satellite capable of transmitting television programs directly to community receivers. Programmatic planning includes program objectives, the mechanics of programming, content for adults and children, development of a multi-media package for inservice teacher training, and the determination of priorities in education, agriculture, health, nutrition, and population control. Technical planning includes village selection, the direct reception system, and an evaluation plan. Extensive interdisciplinary cooperation was demanded by the nature of the project. (Author/STS)

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Planning for Satellite Broadcasting

The Indian Instructional Television Experiment

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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by
Romesh Chander
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Unesco

Foreword

The Satellite Instructional Television Experiment (SITE) undertaken by India during 1975-76, makes use of the first satellite capable of transmitting television programmes directly to community receivers. It is a pioneering project of immense significance, particularly to the developing world.

While the spacecraft was provided under a bilateral agreement by the United States, the ground segment, the organization and management and the programming were entirely the responsibility of India. On the technical side, the experiment prompted important research and development activities and stimulated the local electronics industry. It gave opportunity for experimentation in programming for village audiences, for innovative and low-cost production, for a major programme of social research on needs, potential and effects of television and it provided experience in the management implications of introducing new communication technology. Particularly important were the co-operative aspects of the project, involving the Indian Space Research Organization and the Ministry of Information and Broadcasting as well as other authorites at both Centre and State levels.

The SITE project was thoroughly planned well in advance of execution, though inevitably many plans had to be modified. This Report is the story of that planning. It was prepared immediately prior to and during the first few months of the operation of the experiment. It does not attempt to evaluate SITE. As will be seen, evaluation procedures have been built into the project and will provide the data for an extensive study of successes, difficulties and failures at the end of the experiment. As in the case of this planning phase, India has generously offered to share the results of their experience with the international community.

Unesco hopes that the publication of this report will serve to guide other countries considering similar projects. The authors have been intimately associated with the project from its inception. Mr. Romesh Chander, in 1967, was an Indian counterpart member of the Unesco mission on a pilot project in the use of satellite communication. During a long career with All India Radio, he worked as a Script Writer, Director/Producer, Actor, Administrator, Director of Staff Training, and Director of Television. Until his recent retirement he directed for All India Radio, the preparations for SITE. Mr. Kiran Karnik, a graduate in Physics and in Business Administration, joined the Indian Department of Atomic Energy in 1968. He worked initially on various atomic energy and space projects and for a number of years has been with the Space Applications Centre of the Indian Space Research Organization at Ahmedabad. He is presently manager, SITE Management Office and is also manager of the Programme Production Cell at the Centre.

The opinions expressed are those of the authors' and not necessarily of Unesco.

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Author's preface

The main purpose of this Report is to share with others, India's experience so far in preparing for SITE, for we feel the way challenge is being met has some relevance to other developing countries, particularly those who are planning domestic broadcast satellite systems.

The very nature of this experiment demands an interdisciplinary approach. In addition to the collaboration of engineers, programme producers, educators, communication experts and social scientists from different departments of the Government or professional organizations, the project called for interface with various user Ministries like Education, Agriculture, Health and Family Planning etc., and the State administration, and above all interaction between ISRO and AIR. Never before perhaps have so many people from so many disciplines worked together in a developing country to plan and execute a project. The working culture of not only these Departments and organizations but also of the experts from different disciplines is so distinct that there were bound to be differences of opinion and at times arguments and even frustration which can be illustrated through a telegram received by the Director, Space Applications Centre, from one of the social scientists during pre-testing of programmes in one of the clusters. It said:

> "Feel pre-testing a rural imposition by ISRO on city loving ... folk ... will be back on 14th if no mid course revolution".

As it turned out, by working together, programme producers and social scientists learnt to be evaluated by each other. In a subsequent report she said:

> "A cursory glance at some pre-test data has made the trauma of the field problems seem totally worthwhile".

The first lesson those of us working in the project learnt was that communicators must first learn to communicate among themselves and to appreciate the others' point of view. It is the working level co-operation between individuals that really paved the way for mutual respect and joint effort. We also learnt that action is infectious, and as Professor Yash Pal told the UN/Unesco Regional Seminar on Satellite Broadcasting Systems for Education and Development in Mexico City (2-11 September, 1975)

> "We have found that some things which look impossible are 'do-able'. Others which should take a year according to past experience and conservative plans can be done in four months if we strike a new path. Bottlenecks are not like rigid capillaries; they open wide after a threshold of effort is crossed. A management and operation system with innumerable small feedback loops is the only one capable of performing complex jobs. Group loyalties, academic antagonisms and conflicting interests dissolve once a direction is set and the stream begins to flow".

In this report our attempt has been to share our experiences with the hope that it may be of some interest to those working in the same field. We are aware that these problems are not new; but perhaps never before have all these problems been projected on such a scale. The very size of the project introduces a new element into the situation. We in India therefore look on SITE as a gigantic case study to find answers to technical and programmatic problems in the planning, designing, organizing and creating of a viable system of educational broadcasting by satellite.

I. Brief history of SITE

India's interest in the practical uses of space communications technology dates back to the early 1960's, when the late Dr. Homi Bhabha and the late Dr. Vikram Sarabhai began - with great foresight - an active space research programme in the country. In 1963, a decision was made to set up an Experimental Satellite Communications Earth Station (ESCES) at Ahmedabad. This earth station could serve three major purposes:

1. serve as a centre for building up the necessary technical manpower in the country for a future space research programme;
2. provide training in satellite communications technology to both Indians and foreigners; and
3. carry out some research and development in the area of earth station and ground segment hardware for satellite communication systems.

An agreement was signed with the United Nations Development Programme in 1965 for assistance - totalling about $500,000 - in setting up the earth station. The International Telecommunication Union was nominated by UNDP as the executing agency. Work on the earth station was completed in 1967. Most of the equipment had to be imported from abroad since at that time there was little capability in the country in this area. However, the experience gained in setting up this earth station was immediately utilized when the Indian Space Research Organization (ISRO) took up the prime responsibility for setting up India's first commercial earth station at Arvi (now named Vikram Earth Station after the late Dr. Vikram Sarabhai). The 30 metre antenna as well as some of the electronic equipment was fabricated in the country. The experience gained in the process has been fully used for SITE.

At about the same time that India's first earth station was being set up, a pilot Agricultural TV project (called "Krishi Darshan") was initiated by Dr. Vikram Sarabhai. This project - which was inaugurated on January 26, 1967 - aimed primarily at demonstrating the effectiveness of TV as a medium for propagating new agricultural practices. Since India's only TV station at that time was at Dehli, the project began with 80 community TV sets specially installed in villages around Delhi. Independent evaluations showed a marked improvement in not only knowledge and attitude, but also actual adoption of new agricultural techniques by farmers in the Krishi Darshan villages. This was a milestone in establishing the practical benefits that could flow from a wider introduction of TV in the countryside.

The Unesco panel of consultants on space communication meeting in Paris on 14-15 June, 1966 suggested a satellite pilot project and commented that - "the prevailing conditions in India provide an immense challenge and a spectacular opportunity both for testing techniques and demonstrating the effectiveness of the telecommunications satellite while serving the priority needs of the area through a major contribution to development".

The question of using satellites as a medium for communication was subsequently examined in India by a committee consisting of secretaries of Education, Information and Broadcasting, Defense, Communications, the Director-General Council of Scientific and Industrial Research, Director-General Overseas Communications Services, Dr. Vikram Sarabhai, and Chairman of the University Grants Commission in August, 1966. The general consensus was that India should welcome a pilot project by Unesco and recognizing the fast developing technology, should keep itself in the vanguard of this movement.

Largely upon the initiative of the Indian Delegation, the General Conference of Unesco held in October-November 1966 accepted the recommendations of the Space Panel and authorized the Director-General of Unesco to undertake a study of the feasibility of launching a pilot project in the use of satellite communication for educational and economic development purposes.

At a meeting held in March 1967 the Unesco Panel agreed that "feasibility is no longer the main question, as studies already made have

amply indicated the practicability of using space communication for the purpose mentioned above. In the light of the interest expressed by the Government of India the panel recommends that Unesco should proceed with a preparatory study for a pilot project in India, a country which meets the requirements of large and heavily populated areas, where the needs of education and development are fully recognized and the present broadcasting facilities are only beginning to meet these needs."

A study team consisting of three engineers(1) sponsored by the Department of Atomic Energy visited the USA and France in June-July, 1967 for an on-the-spot study and discussions with the National Aeronautical and Space Administration (NASA) of the United States and CNES in France on the technical feasibility of launching a pilot project of satellite educational television in India. The group came to the general conclusion that it was technically feasible to launch such an experiment in India with a suitable satellite such as one of the series of the "Application Technology Satellites" (ATS) then under development by NASA in the United States.

As a result of the groups' recommendation a joint working group was set up in 1967 by the Indian Department of Atomic Energy (which was then responsible for Space activities also) to study the possibility of using a synchronous communications satellite for TV coverage in India. The group concluded that the most cost-effective solution for India would be a hybrid system, combining direct reception from a satellite in remote villages and reception by rediffusion via conventional TV transmitters in and around cities. The working group also indicated the possibility of conducting a limited experiment using the ATS-F satellite of NASA which was then on the drawing board.

Following the concurrence of the Ministry of Education and the Government of India, Unesco sent an Expert Mission(2) between the 18th November and 8th December, 1967, to prepare a report on a pilot project in the use of Satellite Communication, in co-operation with a counterpart team(3) set up by the Government of India and in consultation with the Indian authorities concerned.

In 1968, as a follow-up to the Unesco Mission's Report, the Government of India set up an inter-ministerial group (the national satellite communications, or NASCOM, group - under the Chairmanship of Dr. Vikram Sarabhai) to look into the possible uses of a synchronous communications satellite for India. This Group had representatives from all the concerned "user" ministries, from the Indian Space Research Organization (ISRO), All India Radio (AIR), Communications, etc. The NASCOM Group had intensive discussions for about 6 months, during which time a number of smaller working groups did a great deal of background work on various aspects of satellite communications, on selection of areas and villages for TV, on maintenance aspects, etc. The report of the group recommended that India should carry out a Satellite TV experiment using NASA's ATS-F satellite. This recommendation was accepted by the Government and the India-USA Memorandum of Understanding for SITE was signed on September 19, 1969. (See Annex A)

In all these steps culminating in the signing of the Memorandum of Understanding, the very vital rôle of Dr. Vikram Sarabhai is apparent. It was primarily his foresight and his commitment to use space technology for practical benefits that led to SITE.

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(1) The group consisted of Mr. B.Y. Nerurkar, Deputy Chief Engineer, All India Radio, Mr. Prasad L. Vepa, Representing Indian National Committee for Space Research and Dr. B.S. Rao of Central Electronic Engineering Research Institute.

(2) Mr. Edward Ploman, Office of Free Flow of Information and International Exchanges, Unesco; Dr. N.I. Tchistiakov, Professor of Radio Electricity in the Institute of Telecommunications, Moscow; Mr. Robert B. Hudson, Senior Vice-President, National Educational Television, New York; Mr. Robert Lefranc, Director, Centre Audio Visual de l'Ecole Normale Superieure de St. Cloud (France); Mr. Nangapuram Gadadhar, Senior Counsellor, International Radio Consultative Committee, I.T.U. Geneva.

(3) Mr. B.Y. Nerurkar, Deputy Chief Engineer, All India Radio, New Delhi; Mr. V.M. Gogte, Deputy Wireless Adviser to the Government of India, Department of Communications, New Delhi; Mr. Romesh Chander, Director of Staff Training (Programmes), All India Radio, New Delhi; Dr. B.S. Rao, Assistant Director Central Electronic Engineering Research Institute, Pilani (Rajasthan); Mr. Prasad L. Vepa, Indian National Committee for Space Research, Ahmedabad; Dr. S.M. Srinivasachari, Deputy Educational Adviser, Ministry of Education, New Delhi.

II. Design of the experiment

A. DESIGN OBJECTIVE

SITE is a specially designed experiment to provide a systems test of the concept of satellite TV. Since it has been planned as an experiment, data collection on various aspects is vitally important, while the design must be such as to provide the maximum amount of insights and information for a future system.

B. COVERAGE

The experiment has been so designed as to get data from as wide a range of situations as possible and the areas to be covered have been selected after detailed analyses. These villages are located in different linguistic, cultural, climatic and agricultural regions of the country. Even in the same area, there are some small SITE villages (population of a few hundred) and some large villages (population approximately five thousand); some close to urban centres and some totally isolated. Thus, it has been ensured that there is a wide range of experimental variables, which will help in assessing the SITE impact in different situations.

C. SOFTWARE DESIGN

Production of TV programmes for SITE is decentralized to 4 different studios - AIR studios at Cuttack, Delhi and Hyderabad (called Base Production Centres) and the ISRO studio at Bombay. Programmes are sent to the satellite from studios at Ahmedabad and Delhi.

Thus, even though a satellite system implies highly centralized transmission, the system has been designed to provide decentralized inputs from different locations.

Programme content also aims at testing this mix of centralization and decentralization. Each of the 6 direct reception clusters receives some programmes made specially for them and also receive a half hour "common programme" which is meant for the whole country. The former are in their own language and geared specially to their concerns, while the latter are in Hindi with its scope and perspective being much wider.

Broadcasts are in two sessions: one in the morning, meant for school children in the 5 to 12 year age group; the second in the evening, mainly for adults. The morning broadcast is broadly educational and includes science, hygiene, geography, creative activities, etc. The evening broadcast carries specific instructional messages and also aims at national integration through cultural programmes, plays etc.

Ideally, it would have been good to cover all the various cultural and linguistic regions of the country. However, the limited number of sets to be deployed (2,400) and the limited broadcasting time available from the satellite (4 hours a day) were constraints. Because of these, and considerations related to the economy and logistics of maintenance, it was decided to locate the direct reception system units in 6 "clusters" of about 400 each.

An important aspect of the experiment design - and one never tried before - is the simultaneous broadcast of 2 languages along with the picture. Given the cultural diversity of India, this is a critically important aspect which will have great bearing on future system planning.

The experiment design includes a utilization or programmes-support activity component, in certain selected villages, incremental impact of which will be analysed.

During school vacations, the morning transmission time is used for teacher training programmes. These TV programmes form one component of intensive teacher training camps, at which almost 100,000 primary school teachers will be trained during the SITE year.

D. HARDWARE DESIGN

The overall system design for SITE hardware includes three main modes of TV reception:

(1) directly from the satellite (by the direct reception system);

(2) through rediffusion by large terrestrial TV transmitters;

(3) through rediffusion by low-power limited rebroadcast (LRB) TV transmitters.

A brief description of the different modes of TV reception and the location of these for SITE is given in Table 1.

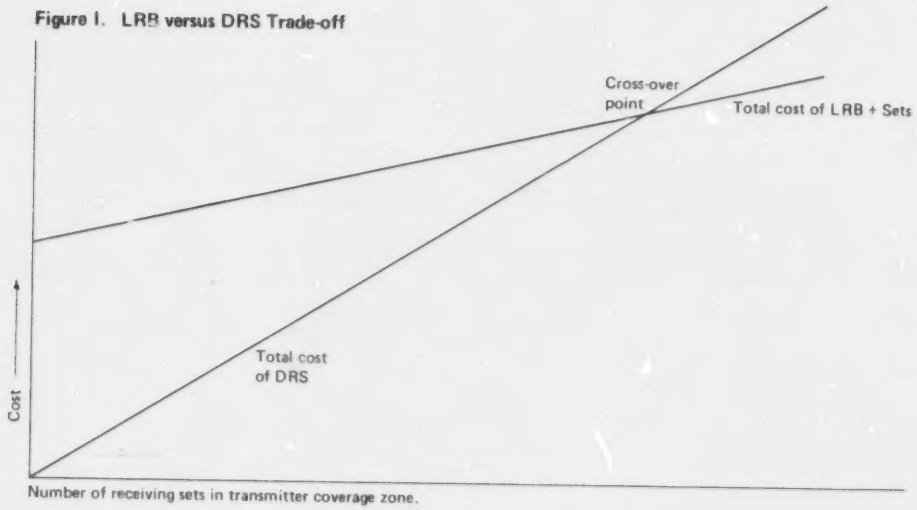
TABLE 1 - MODES OF TV RECEPTION AND THEIR LOCATIONS

Mode of reception	Total No.	Locations	Main Elements
Direct reception	2340	Andhra Pradesh Bihar Karnataka Madhya Pradesh Orissa Rajasthan	3_m diameter chicken-mesh parabolic antenna, front-end converter, TV set.
Rediffusion by large/medium TV transmitters	3	Ahmedabad-Pij	6_m chicken-mesh receive antenna, low-noise front-end (all at Ahmedabad), 50 km cable/microwave link, 1 kw transmitter (at Pij)
		Amritsar	6_m chicken-mesh receive antenna, low-noise front-end, cable link, 10 kw TV transmitter
		Delhi	10_m solid antenna, receiver chain, cable link, 10 kw TV transmitter
Rediffusion by LRB.	2	Sriharikota (SHAR)	4.5_m chicken-mesh antenna, low-noise front-end, low-power (15 watts) TV transmitter
		Mobile LRB	3_m chicken-mesh antenna, low noise front-end, low-power (15 watts) TV transmitter, pole-mounted TV transmitting antenna - all carried in a mobile van.

The direct reception system (DRS) has been installed in 2340 villages speciailly selected for SITE. These are small, invariably isolated villages with almost no man-made radio noise. The DRS is adequate for good quality reception. In large cities, however, the problem of man-made radio noise is quite severe. Also, the density of sets (number of TV sets per sq. km) is very high. In such situations, on grounds of both economics and good signal quality, it is more advantageous to receive the satellite signal at a single point and then rebroadcast it using a regular terrestrial TV transmitter. The system in this case consists of a fairly sophisticated earth station (to receive the signal from the satellite), a TV transmitter, and a cable and/or microwave link between the two.

The DRS and the sophisticated earth station - large TV transmitter complex - thus take care of the isolated village and the large city respectively. However, there are many small towns or concentrations of villages where the TV set density could be fairly high, but - unlike in a city - not very extensive. Also, the level of radio noise may be lower than in a city. The concept of a low-power limited rebroadcast (LRB) TV transmitter system was evolved to meet such situations. The LRB consists of a simple receive system (a chicken-mesh parabolic antenna 4.5_m in diameter and a low-noise - about 3 dB NF - "Front-end") co-located with a low power TV transmitter. This set-up involves a comparatively large fixed investment but lower incremental cost per additional TV set than the cost per DRS. Thus, at some particular TV receiver density, there will be a crossover point and beyond that the LRB is more economical. This is graphically illustrated in Figure 1.

Figure I. LRB versus DRS Trade-off



No LRB's were originally planned in SITE. However, it was later decided that this promising concept should be tested. Accordingly, two suitable locations - Sambalpur in Orissa and Muzzafarpur in Bihar - were tentatively identified. The selection was based on various criteria including the number of villages that could be covered and suitability for location of a transmitter. Within a radius of 15 kms, Samabalpur has a total of 75 villages around it and Muzzafarpur 110. Setting up LRB's at these locations would provide very useful data on the LRB vs. DRS trade-off. However, due to financial and other constraints, these two LRB's had ultimately to be dropped. Instead, a LRB has been set up in Sriharikota at ISRO's SHAR Centre and a Mobile LRB is also ready. Cost data from these will help in studying the trade-off and in working out the economics of low-power TV transmitters for rural coverage.

SITE is basically a hybrid system combining both direct reception from the satellite and reception through terrestrial transmitters linked to the satellite. The rediffusion facilities cover a range of earth stations (with antennas ranging from solid 10 m diameter parabolas to 3 m chicken mesh types), and a wide range of TV transmitters (10kw, 1 kw, 15 watts). Cost and performance data from these different combinations will help in future in choosing an optimum reception system for any particular situation.

Two earth stations (Ahmedabad and Delhi) are used for transmitting to the satellite. Each of these stations has two chains (one operating and one standby) to take care of any equipment problems. Each of the stations is also equipped with a diesel generator, to take up emergency power supply in case of a mains failure. Pointing to the satellite is based on orbit predictions. These, in turn, depend on the range and range rate data, some of which is supplied to NASA from Ahmedabad. Based on the predictions, Delhi points towards the satellite. However, in Ahmedabad, the predictions are processed by a computer which feeds results directly to the antenna for correct pointing. Thus, Ahmedabad is operating on a "programmed tracking" mode.

A receive-only earth station has been set up at Amritsar. This has been co-located with the TV transmitter so that a microwave link is not necessary and for demonstrating that such co-location does not result in any radio frequency interference.

The experiment design called for testing of TV reception in unelectrified villages. Therefore, about 150 battery operated DRS have been installed in Orissa. These will provide useful data on costs and on logistics problems involved.

Another important element of experimentation

with DRS is the use of some (500) specially ruggedized sets. The data on the breakdown rate etc. of these as compared with the regular, non-ruggedized sets will be useful in determining the optimum point between investment in reggedization vs. maintenance cost for Indian conditions.

Further technical details, including a description of the earth stations and rediffusion facilities are to be found in Annex B.

E. EVALUATION

Of paramount importance is the evaluation of different aspects of SITE. A detailed technical evaluation has been planned. This covers all the major components of SITE and also the system as a whole. An extensive social research and evaluation plan has also been drawn up. This includes formative research, process studies and impact assessment. A variety of research studies are being undertaken and these will provide both large-scale quantitative data and in-depth qualitative case-studies. An evaluation of the organization structures and management systems used for SITE as also a cost analysis is also planned.

III. Village selection

In view of the limited broadcasting time, considerations of economy and logistics of maintenance it was decided to install only 2400 direct reception receivers in SITE in 5 clusters of about 400 villages each. The process of village selection for installation of DRS had two main steps:

(1) selection of areas in which the clusters were to be located; and
(2) selection of villages in the clusters.

A. CLUSTER SELECTION

The criteria adopted in selecting the cluster areas were: (a) backwardness, (b) continuity of television service in the area on a continuing basis after SITE, (c) maximum common agro-economic conditions to get across the message, and (d) availability of matching facilities and infrastructure on the ground so that the aspirations or expectations created through television programmes could be satisfied.

Selected areas present a fair cross-section of different stages of development - they include comparatively developed areas as well as those which are less developed.

It was decided to select the backward areas so as to study the potential of TV as a medium of development, whereas infrastructure is necessary for supporting the TV message. For application of the first criteria Planning Commission's definition of backwardness was adopted and States having the largest percentage of backward and second level districts were listed. According to the 1971 Census Report states of Orissa, Bihar, Andhra Pradesh, Utter Pradesh, Rajasthan, Madhya Pradesh, West Bengal and Karnataka fall in this category.

Since Utter Pradesh and West Bengal were to get terrestrial television by the end of SITE, it was finally decided to locate the direct reception clusters in the States of Rajasthan, Bihar, Orissa, Madhya Pradesh, Andhra Pradesh and Karnataka. (See Figure II).

For selecting the actual cluster areas in these States, the criteria applied were continuity for TV coverage immediately after SITE and where feasible, contiguity. The purpose of the latter was to maximize the utilization of available satellite time by broadcasting simultaneously two audio channels with one video channel. Thus, contiguous areas in adjacent states were chosen so that the picture could be accompanied by two languages. The chosen areas in Andhra Pradesh and Karnataka are one such contiguous pair, while the clusters in M.P. and Orissa form a second pair.

The districts finally chosen and the maintenance centres for each cluster are listed in Table II.

B. VILLAGE SELECTION

Each cluster area covers 3-4 districts and each district on an average has about 1000 villages, so the problem was to select 400 out of about 4000 villages. A simple statistical random sampling was not advisable, because villages selected for SITE had to satisfy certain minimum technical and sociological criteria. The technical criteria emerged mainly from considerations of installation and maintenance of TV sets, whereas the sociological criteria took into account the viewing situation.

As a starting point, the maintenance centres were selected: one headquarters and three subcentres in each of the 6 clusters. Places having the largest number of electrified villages around them were selected as the maintenance centres.

At first, the plan envisaged collection of detailed socio-economic and demographic data which, along with the hardware criteria, would be the basis for selecting villages. However, initial experience indicated that the process would not be one of selecting (implying a process of eliminating) 2400 villages from about 35,000 in all the clusters, but would rather be one of finding an adequate number of villages that would fulfill even the minimal hardware criteria. In view of this, most of

Figure II. ATS-F coverage of India at 860 MHz and receiving cluster locations

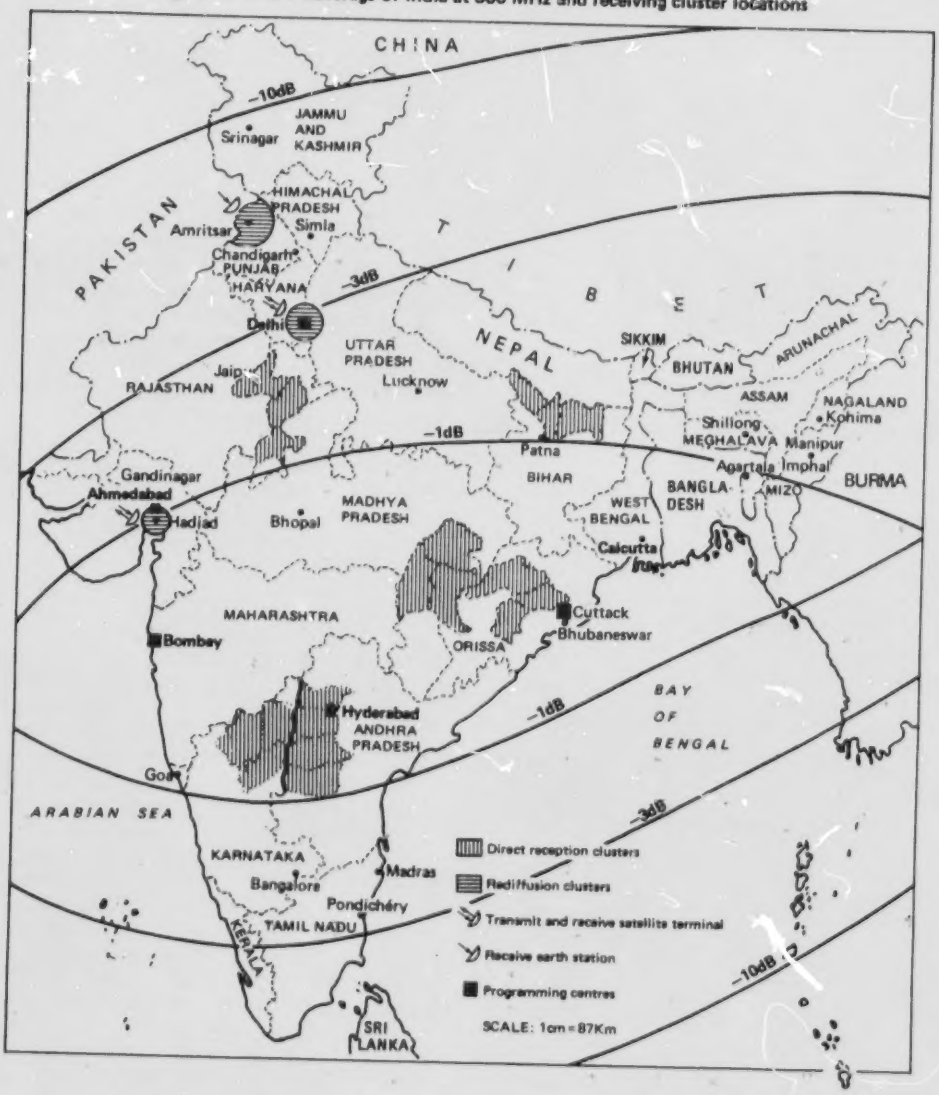


Table II

CLUSTER DISTRICTS AND MAINTENANCE CENTRES FOR SITE

Cluster	Districts*	Maintenance Centres
1. ANDHRA PRADESH	Hyderabad	Hyderabad
	Kurnool	Nandyal
	Medak	Sangareddy
	Mahboobnagar	Nagar Kurnool
2. KARNATAKA	Gulbarga	Gulbarga
		Bagalkot
	Raichur	Raichur
	Bijapur	Bijapur
3. BIHAR	Muzaffarpur	Muzaffarpur
	Champaran	Motinari
	Saharsa	Saharsa
	Darbhanga	Darbhanga and Samastipur
4. MADHYA PRADESH	Raipur	Raipur and Mahasamund
	Bilaspur	Bilaspur
	Durg	Rajnandgaon
5. ORISSA	Sambalpur	Sambalpur
	Dhenkanal	Dhenkanal and Angul
	Baudh Khandmals	Baudh
6. RAJASTHAN	Jaipur	Jaipur and Chomu
	Kota	Kota
	Sawai-Madhopur	Gangapur

*Some of the districts have since been split up and renamed.

the non-essential (but desirable) criteria had to be given up and replaced by the essentials only. Of course data was collected on all the socio-economic and demographic variables, but these were no longer considered selection criteria.

Finally, the basic criteria used were as follows:

(1) The village must be within a radius (as the crow flies) of 40 kms. from a maintenance centre. In practice, in clusters where enough suitable villages were not available within a 40 km. radius, villages upto 60 km. along a highway were also considered.

(2) In all clusters (except Orissa) the TV sets would be installed only in villages having domestic electric supply. In Orissa, villages for installation of battery-operated sets need not be electrified but must be within 10 km. of a maintenance centre.

(3) From a maintenance point of view, the village should be approachable by jeep throughout the year. This criterion was relaxed to include those villages which are accessible during most months of the year.

(4) The village must have a suitable public building. Preference was given to school buildings or Panchayat Ghars.(1)

The suitability of the building was judged on the following points:

(1) The building should provide proper security for the TV set. It should have doors and windows which can be closed and locked. The roof should not have leaks.

(2) It should be possible to mount the 3 metre antenna either on the roof of the building or in open space around the building.

(3) The antenna should have a clear view of the satellite i.e. there should be no obstruction in the form of tall trees or hillocks or High Tension power wires in the south-west direction at an angle of 35°.

(4) The nearest electric pole should not be more than 200 metres from the building (except in villages selected for deployment of battery-operated sets).

(1) Community Halls.

(5) The population of the village must be between 500 and 5000.

Using extensive secondary data, the number of candidate villages in the chosen districts was reduced from about 35,000 to about 10,000. It was considered essential to actually visit these villages to choose the final 2400. Accordingly, for about a year from November 1973 ISRO teams - including both technical and social science personnel - visited over 6000 villages to collect first-hand data.

Such teams consisted of one technical person and one social scientist. At the peak of village selection activity, as many as 24 teams were operating in different parts of the country. Experience has borne out the vital necessity of an actual visit. For example, many so-called electrified villages had no power at all or it had been disconnected long ago for non-payment of dues. In some cases there was only agricultural power in the fields. Identifying a suitable public building was also a vital job requiring on-the-spot decisions. Another important spin-off of the visits was the identification of a person in each village who could be entrusted with the set, though the appointment of the custodian(1) was formally finalized by the State Government concerned. The data collected by the field teams was analysed and computer processed for the final selection of villages. In some States, additional and repeat visits had to be undertaken since a sufficient number of villages could not be selected in the first round. Some of the problems encountered were as follows:

(1) the comparatively small number of villages which have domestic (as opposed to agricultural electric supply);

(2) the even smaller number of electrified public buildings - especially schools, which being day-use facilities hardly need electric supply;

(3) the problem of finding a suitable public building;

(4) technical problems mainly related to not having a clear look-angle (for the 3 metre antenna) towards the satellite and no proper place for mounting the antenna;

(5) unexpected difficulties like the hazards of monkeys damaging the antenna and leaks in thatched roofs during the monsoon.

In spite of actual field visits and various counter-checks, some problems crept into village selection mainly due to a last-minute effort to get 400 villages in each cluster. For example, in spite of the distance limits mentioned in the criteria, there are a few villages in Orissa which are over 100 km. from the maintenance subcentre. There are also some villages which are cut-off due to floods for as much as 2 months of the year. Such cases are providing invaluable experience in defining the requirements of a maintenance system.

Then again, in selecting the villages, it had to be ensured that for effective utilization of the television message minimal supporting infrastructure was available in the area. For example, a message for better agricultural practices is followed up by availability of better agricultural implements, fertilizers and seeds etc. This infrastructure was classified as follows:

(1) Health and Family Planning infrastructure:
   (a) Headquarters of male and female Family Planning worker;
   (b) Family Planning subcentre;
   (c) Primary Health Centres;
   (d) Health subcentres and maternity and child welfare centres.

(2) Educational Infrastructure:
   (a) Primary/Middle/Schools;
   (b) Education Extension Services;
   (c) Availability of teachers.

(3) Agricultural Infrastructure:
   (a) Co-operative society;
   (b) Headquarters of the village level extension worker (VLW);
   (c) Farmers discussion group and Radio forum.

(4) Supportive Infrastructure:
   (a) Panchayat Ghar (Community Hall);
   (b) Youth club/Women's club;
   (c) Post Office.

(1) The custodian is responsible for the safe custody and operation of the TV set.

IV. Direct reception system

A. DESCRIPTION

The direct reception system (DRS) is - as its name implies - the equipment that enables TV signals to be received directly from the satellite itself. For SITE, the TV signal from ATS-F is beamed down at 860 MH_z and consists of one video channel accompanied simultaneously by two audio channels.

The DRS being used in SITE consists of an antenna, a front-end converter and a TV set. The antenna is 3_m in diameter and made of ordinary chicken-mesh, with a helical feed. It can be either mounted on the ground or wall-mounted. A third type of mount involves embedding the mesh in a solid structure.

The front-end is made up of a "head-end" and a "tail-end" connected by a 15_m cable. The head-end is mounted on the antenna itself and receives the satellite signal from the feed of the 3_m antenna through a short low-loss cable. It amplifies the signal, converts to 70 MH_z and sends it to the tail-end. The tail-end extracts video and one of the two audios (through a pre-set switch) and sends these to the normal TV set through an interfacing "patch card". The tail-end and patch-card are physically located inside the TV set cabinet with a 24" screen.

B. DEVELOPMENT

With a view to maximizing the indigenous content of the total system, a decision was taken to develop and fabricate all the ground segment hardware in India itself. Development of the DRS was indeed a challenge: it not only involved rigid technical specifications, but also doing this at the lowest possible cost. Since DRS units will necessarily be deployed in very large numbers in any future operational satellite-based TV system, cost is a vital consideration. In fact, the cost-effectiveness of a satellite system and its utility in terms of taking TV to isolated villages are both largely dependent on the per unit cost of the DRS.

Initial studies indicated that the optimum receive system for SITE would require a 3_m diameter chicken-mesh antenna with a gain of about 24 dB and a front-end with a noise figure of better than 8 dB. Various designs were tried out for the antenna. Cost trade-offs involved in using different materials were looked at and the final design evolved. An important non-technical consideration was the availability of particular sizes, thickness etc. of the material. In an extremely time-bound situation and one in which a scarcity of particular types of material existed, this became a major constraint to be kept in mind.

The design of the 3_m antenna and some of the actual prototype antennas were put through a series of tests that included measurement of electrical properties (gain, etc), time required for assembly of the antenna in a village, static tests by loading, etc. A firm of structural engineers was also hired to do an analysis of the design and they made certain recommendations to further strengthen the antenna. Most of these were adopted but some expensive changes did not seem cost-effective in terms of the higher investment vs. lower maintenance cost trade-off.

The complete know-how including design and drawings, etc. of this antenna as developed by ISRO were transferred to a public sector manufacturing company - the Electronics Corporation of India Limited (ECIL), Hyderabad.

A 3_m antenna of a different design was also developed. This basically does away with the mount and the mesh is implanted on a stone, cement and mud structure designed so as to get the right pointing angle. The solid structure can be built largely with local materials and manpower and is therefore quite inexpensive.

Design of the electronic front-end converter was a more complex and time-consuming job. Not only would the front-end have to operate efficiently throughout the year in adverse environmental and weather conditions, but the unit would have to be a low-cost one. There was no previous experience to work on, since such low-cost units

had not been produced in quantity anywhere in the world. In spite of initial problems a prototype was built. The first few units were subjected to rigorous test and evaluation. A prototype was also sent to NASA and its compatibility with the satellite tested while the satellite itself was undergoing tests on the ground. The "know-how" for the front-end also was transferred to ECIL.

ECIL, itself was already manufacturing TV sets and, after a detailed analysis of alternative designs, it was decided that the basic ECIL design would be quite adequate for SITE, with a few changes. The solid state TV receiver being used in SITE is modular in construction with five printed circuit boards. Thus, most faults can be repaired by merely replacing the defective board. This not only vastly speeds up maintenance, but also reduces wastage of skilled manpower in petty maintenance jobs.

In order to better withstand possible rough handling and to obtain useful data for the future, some TV receivers have been specially ruggedized. This has been done, after studying in detail the design, the operating environment, and available data on the set performance, mainly by using better components and providing greater safety margins. The failure data on these receivers as compared to the ordinary, non-ruggedized sets should provide useful information for further analysis of the ruggedization cost vs. maintenance cost trade-off. Another special feature is all mains-operated TV receivers in SITE is the incorporation of an ECIL developed voltage regulator which enables the set to work at any voltage between 170 v and 250 v.

In order to obtain data and experience regarding problems of sets in unelectrified villages, costs involved, additional manpower and transport requirements, etc. 150 specially designed sets that operate from 12 volts car batteries have been installed in some remote villages.

C. MANUFACTURE

As mentioned earlier, the manufacture of the total DRS -including the 3_m antenna, and the front-end - was contracted to the Electronics Corporation of India Limited (ECIL), located at Hyderabad. To facilitate transfer of "know-how" and to expedite production, some ISRO engineers who had developed these units were posted to ECIL. As a result, the usual time-lag between the development of a prototype and actual production was cut to a minimum.

Since ECIL already had a well-set production line for TV sets, the manufacture of these posed fewer problems. In contrast, there were numerous problems with regard to the manufacture of the 3_m antennas. The problems began with raw material shortages. Many of the required sizes and sections were just not available on the market. Because of this - and the tight time schedule - design changes had to be made taking into account available material. Machine breakdowns and a strike at one of the main suppliers, and electricity power cuts further upset the delivery schedule. As a result of all this, deployment of DRS in the clusters slowed down to an extent. However, in later months, the production picked up to greater than the planned rate.

On-line testing of the antennas was done. This included various forms of mechanical testing (including total assembly of 100 percent of the antennas), feed testing for VSWR (100% of the feeds) and gain testing (1% of the antennas). In addition, 1% of the antennas were sent to Ahmedabad for testing.

Production of the front-end proceeded smoothly and was greatly facilitated by the close interaction between the production (ECIL) engineers and the development (ISRO) team. In fact, a batch production run of about 30 units was made jointly at ECIL. This helped to identify all production problems from the ISRO design and to get the production line going. As a result, production of the front-ends was completed more or less on schedule, once again showing that advanced technology seems to present fewer problems than the older technologies.

D. INSTALLATION

Installation of the DRS units was done in three phases. In the first phase, the 3_m antenna was physically installed (without feed) and the TV set (with tail-end) tested in the village. The TV set was then put back into its packing case and left with the custodian in the village.

The second phase involved the following activities:

(1) fixing the feed on to the 3_m antenna;
(2) pointing the antenna towards the satellite;
(3) unpacking and installing the TV set;
(4) installation of the front-end [illegible] antenna;
(5) checking out the complete system.

The third phase involved the actual checkout with the satellite itself. This was completed on schedule in almost all villages by requesting NASA to make the satellite available for a longer period during the pre-SITE check-out phase.

Phase I of deployment began in November 1974 in 3 of the SITE clusters. In the remaining 3, it began in December. Phase II began in mid-March 1975, slightly ahead of the planned schedule.

There were some delays in delivery of the DRS units - particularly the 3_m antenna. As a result, the planned schedule for deployment (Phase I to be completed by 15 April 1975, Phase II by 15 July 1975) could not be met. A decision was therefore made to combine Phase I and II in some villages, phase II and III in some others.

Before starting deployment of the DRS units, a complete simulation exercise was carried out in

a village near Ahmedabad. A DRS unit was set up, involving Phases I and II. A time and motion study was conducted while the DRS unit was being installed, so that the exact time taken for each activity was noted. This served two purposes: to see if any of the activities could be done more efficiently; to use the data (time taken, etc.) for drawing up a realistic deployment schedule. This simulation also provided insights into the best methods and tools for installation, the number and skill of personnel required, etc. The antenna pointing system specially devised by ISRO was also tried out and was found to work well. The system basically uses the sun as a reference. It thereby avoids the pitfalls inherent in using a magnetic compass, especially in hilly or high iron ore content areas.

Phase II ended with a complete system check-out. This was necessary because Phase III could not be done in all villages before SITE began. Thus, it became necessary to simulate the satellite signal in some way. A special portable unit was developed which simulates the TV signal emanating from the satellite at 860 MHz, complete with 2 separate audio channels. This versatile equipment is used for maintenance too, since it enables a total system check-up after repairs even without use of the scarce satellite time.

For deployment, 24 teams each consisting of a technician, 2 mechanics and a vehicle were put in the field - 4 in each of the clusters. At the peak of the operation, this number went up to 26 teams. Though the original plan assumed that each team would install one antenna (Phase I) per day and would work 5 days a week, some of the teams were in fact - able to install 2 antennas per day and in the final stages of Phase I, many teams worked 6 and 7 days a week. Main constraints faced by the installation teams were:

(1) the distance and road conditions from village to village, often requiring considerable travel time;
(2) the limited carrying capacity of the vehicles - especially for the large boxes containing the 3m antennas.

An interesting experience was the erection of what has come to be known as "self-help antennas". As an experiment it was decided to install in Rajasthan a few antennas which have a support structure of mud and stone. The enthusiasm of the villagers and the actual help provided by them was beyond expectations. The experience once again reinforced the planners' belief that one can depend upon locally available resources - particularly manpower - for any project that the villagers consider worthwhile and exciting. The success, even in a small way, of this philosophy has ramifications much beyond SITE itself.

E. MAINTENANCE

The DRS maintenance organization is based on a three-tier set-up. At the lowest tier are the maintenance subcentres of which there are 4 in each cluster. Each of these subcentres is manned by a technician who has a vehicle and driver at his disposal. After receiving the Fault Report Card (FRC) from villages in his sector, the technician schedules his visits, identifies the faulty module in the set, and gets the system working again by replacing the faulty module. Thus, he "repairs" the set by replacement of one of the modules as a whole and not by actual repair of any one module. In the case of a problem with the front-end, he only identifies whether the problem is with the head-end or tail-end and just replaces the faulty unit. This "replacement approach" has three distinct advantages:

(1) the DRS is set right quickly, minimizing both the down-time and the time taken by the technician per fault call;
(2) test equipment requirements are minimized;
(3) the training and skill-level requirements of the technicians are not too high.

One of the 4 subcentres in each cluster is also the cluster maintenance headquarters. While the technician at each subcentre has some inventory of spares in the form of TV receiver modules, tail-ends and head-ends, the Headquarters besides maintaining a larger inventory of these spares also has an inventory of other components along with the more sophisticated test equipment. In terms of manpower, each of the 6 Cluster Headquarters has an Engineer-in-Charge, two technicians, a vehicle with driver, plus administrative support staff. These Cluster Headquarters are basically the second tier of the maintenance system. Each Cluster Headquarters also has in stock some spare TV sets and spare picture tubes for replacement of broken tubes or sets that seem to develop difficult problems. Spare segments of the 3m antenna, spare feeds and ribs are also stocked by the Cluster Headquarters and the subcentres. As a part of their contract ECIL, manufacturers of the TV sets, has stationed one engineer and two technicians at each of the 6 Cluster Headquarters for repairs of faulty TV receiver modules. The philosophy is to minimize not only the receiver down-time, but more particularly the non-viewing time of the community. Since each cluster has approximately 400 sets and 4 subcentres, on an average each subcentre looks after about 100 DRS units.

One of the criteria for selection of villages in SITE was that the maximum distance from a maintenance subcentre should not exceed 60 kms. However, though the radial distance from the subcentre may be only 60 km or even less, the actual road distance is sometimes over 100 kms. This has further strained the maintenance system.

Maintenance of the front-ends requires highly

trained engineers and expensive and sophisticated test equipment. It was therefore decided to carry out the maintenance of the front-ends at only two locations: at ECIL (the manufacturers of the front-ends) in Hyderabad, where trained manpower and adequate test equipment already existed; and in Delhi, where some of the test equipment available at the earth station could be shared. The arrangement has been found to work well and is also cost-effective.

Detailed logs are maintained at each centre regarding the failures and maintenance calls. The data is sent weekly to Ahmedabad from all the sub-centres for monitoring the status of the DRS. The data is being computerized for a detailed analysis of the faults, and will provide useful feedback on set design. The analysis will also help in improving the maintenance system and in taking advance action for ordering additional spares, if required.

Initial field experience has thrown up some rather unexpected problems. The human tendency of turning all knobs to the maximum position was not taken into consideration. It has been found that in many villages the brightness of the set is kept at the maximum. When this is done and the set is turned on and off frequently, one of the fuses blows off. Thus, a majority of the complaints in the first two months of SITE were due to this problem. Though the fuse can be replaced fairly easily, it requires one of the technicians to go from the subcentre to the village, which may be 60 km away. It has been noticed that (apart from natural tendency) the brightness is usually on "full" because of the high ambient light during the morning transmission. In one village it was found that the TV set was being used as a fluorescent lamp.

Another problem is that fault cards are often received for very minor problems like antenna misalignment, vertical or horizontal hold problems, etc. During phase II of deployment, custodians of TV sets in the villages were given training on these points. They have also been given illustrated instruction manuals. This was obviously not enough. The initial philosophy was to discourage them from tempering excessively with the set. In the light of fresh experience, it is now being considered whether they should not, in fact, be trained further and called upon to do more themselves. Already, some programmes have been televised on "Operating the TV Set" (including turning down the brightness before switching on). At the same time, the possibility of appropriate modifications in the TV set circuits was explored and the necessary changes in the circuits are being made.

SITE began at a time when the monsoon was at its peak. Three of the SITE clusters have had severe floods. As a result, many of the roads were breached or even washed away, and many SITE villages became totally unapproachable. Communications too broke down and there was no way of even knowing whether a set in a particular village was working or not. However, the floods provided some rare instances of the villagers' enthusiasm for television. In one village, a faulty TV set was strapped to a cot and carried from the village through waist-deep water to the main road where the maintenance team awaited it. In another case, when the maintenance team could not reach a particular village because of floods, they were carried across flooded fields by a tractor specially requisitioned by the villagers. In some places sets were brought to the maintenance centres by boats.

Due to heavy rains, water sometimes got into the protected connector at the head-end and this simple problem resulted in many sets being down immediately after SITE began. However, with the decrease in the intensity of the monsoon, and the corrective steps taken in terms of instructions to the custodians, the maintenance situation improved considerably after the first three months of the Experiment, as shown in Table III.

Table III - DRS MAINTENANCE STATUS

CLUSTER	Approx percentage of working sets	
	Around August-end	Around November-end
	%	%
Andhra Pradesh	70	95
Bihar	60	80
Karnataka	80	88
Madhya Pradesh	68	90
Orissa	70	90
Rajasthan	65	85

F. POWER SOURCES

Even in electrified villages, it was only rarely that the particular public building chosen for installation of the set was electrified. For instance, only 84 of the 400 chosen villages in the Karnataka cluster had electricity in the selected building. In the remaining 316 villages, the distance of the nearest power line from the selected building was less than 60 metres in 280 villages, and between 60 metres and 180 metres in 36 villages.

In May 1974, a major effort was launched to get the selected buildings electrified. This involved contacting the concerned State Governments - at both administrative and political levels - and the State Electricity Boards. Though many sceptics doubted whether this major problem could be solved in time for SITE, the results were, in fact, astounding. The interest and enthusiasm of the State authorities concerned was so great that they

agreed to not only arrange for electrification of the selected building but also to ensure that electricity would not, as far as possible, be cut-off during SITE transmission hours even if there were compulsory cuts due to power shortages.

In order to make sure that the electrification of selected buildings was completed in time, "Operation Electricity" was organized. This involved the posting of one Technical Co-ordinator to each of the concerned States to co-ordinate and follow-up the work of the State Electricity Boards, which are the executing agencies. This continuous liaison and the interest taken by the State authorities paid off and the electrification was completed in time.

With this interest, enthusiasm and the willingness of the States to bear the expenses, there would have been no problem in getting all the SITE villages electrified. However, in terms of the future and the experimental nature of SITE, and considering that 70% of India's villages are not yet electrified, it was decided that some sets would be installed in unelectrified villages. After looking at various sources of power, it was felt that in India, in the time-frame of SITE, batteries were the most cost-effective solution. Solar cells incidentally are yet too expensive and will pose problems during the monsoon. It was therefore decided to install 150 battery operated sets with 50 sets to serve as spares. Modification of the sets for battery operation posed no particular problem.

In view of the logistics problems involved, and the need for fairly large-scale data, all these sets are located in Orissa. Two 12 volt automobile batteries providing 24 volts and 88 ampere hours are used for each set. Normally batteries are recharged every week. The procedure is to replace the discharged batteries with freshly charged ones and to then recharge the former at the subcentres.

The battery sets have one major advantage - they are not subject to wide voltage fluctuations. In spite of a special 160 V to 250 voltage regulator, the mains-operated sets still have fluctuation problems. With the battery sets, the basic problem is recharging. Scientists and engineers are already working on alternative power sources for TV receivers. One such source is wind power. There is plenty of wind energy available in many parts of the country, particularly along the coastline and in Gujarat, Saurashtra and Rajasthan. A television set requires only about 200 watts of power, easily generated by a small wind electric generator. However, the unit cost of an aerogenerator is too high in terms of the cost of the television set. A new type of windmill has been developed which could power a TV set and at the same time supply the mechanical energy to pump water and to operate village industries and community services.(1) The economics of this type of multi-purpose windmill are favourable since the cost of the windmill can be distributed over the number of uses to which it is put. Tests, currently being conducted by the Bharat Heavy Electricals, Ltd., will determine the technical viability of this windmill.

(1) The windmill has been developed by Robert Tyabji of UNICEF, New Delhi.

V. Programme objectives

A. INTRODUCTION

It has sometimes happened that the development of new channels for communication has coincided with the practical application of new thinking. Television in India - more so the Broadcasting Satellite - is arriving at a time when the pattern of society is changing in the country. There is a visible effort to harness energies to promote social and economic development, to spread education and to raise the general standard of living. To help achieve this, the urgent need to disseminate information is obvious. It is in the context of these objectives that India hopes to develop its strategy in the Satellite Instructional Television Experiment (SITE).

Efficiency of television depends upon the rôle which is assigned to it. This rôle was succinctly defined by a seminar on Software Objectives of Indian Television(1) in some of its recommendations to the Government:

> "Television must be utilized in the developmental process as an instrument of social change and national cohesion by unhesitatingly upholding progressive values, and involving the community in a free dialogue. Indian Television has to shun an elitist approach and consumer value systems and evolve a truly national model. Television as a support to better education should assist the teacher effectively. It should cater to both in-school and out-of-school education. Primary education should be given priority. However, experiments at other levels of education should also be carried out. TV should disseminate information about specific aspects of science and technology, agriculture, health, family planning etc. with the assistance from supportive units in the concerned departments. It should also take an active rôle in developing a scientific temper by taking up the day-to-day problems of people.(2)"

Therefore, in SITE, India proposed to concentrate on national integration, upgrading and expending education to suit the requirements of the country, health and nutrition, help in population control, modernizing agriculture, creating a scientific awareness and, in general, contributing to the betterment of life, particularly in rural areas.

Keeping these objectives in mind, mechanics of programming and programme contents have been planned in collaboration with the user agencies.

The executive agencies for the ground segment responsibilities in SITE are the Indian Space Research Organization (ISRO) and All India Radio (AIR). By and large, ISRO is responsible for the hardware - including the development, installation and maintenance of augmented community receivers - and All India Radio for the programmes that will be fed into SITE. But in an experiment of this nature all items of responsibility cannot be rigidly classified into hard and software groups: there is a wide area where interaction between these two agencies is necessary.

Involvment of departments concerned with education, agriculture, health and family planning etc. which need television support for their programmes, is one of the prerequisites to the success of the Experiment. To ensure close co-operation amongst all these agencies and proper co-ordination of effort at all levels, various Committees and Working Groups were set up. The overall guidance was provided jointly by the Secretaries of the Ministry of Information and Broadcasting and the Department of Space. The Organization Chart is in Figure III.

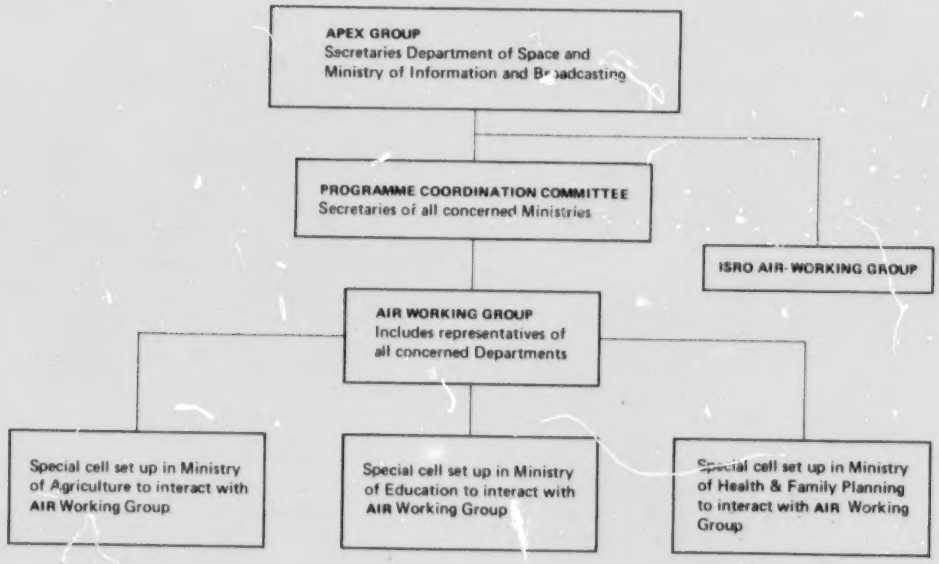
B. PROGRAMME PRIORITIES

Though AIR has the overall responsibility for programme generation, the programmes are made in consultation with experts from the concerned departments of the State and Central Governments

(1) 16-18 February 1973; sponsored by All India Radio.

(2) Recommendations 1, 6 and 8 of the Seminar.

Figure III. ORGANIZATION CHART


APEX GROUP
Secretaries Department of Space and
Ministry of Information and Broadcasting
PROGRAMME COORDINATION COMMITTEE
Secretaries of all concerned Ministries
ISRO AIR WORKING GROUP
AIR WORKING GROUP
Includes representatives of
all concerned Departments
Special cell set up in Ministry of Agriculture to interact with AIR Working Group
Special cell set up in Ministry of Education to interact with AIR Working Group
Special cell set up in Ministry of Health & Family Planning to interact with AIR Working Group

who provide the technical and other specialized inputs. Separate Committees for programmes on Education, Agriculture, Health and Family Planning have indicated their programme priorities.

1. Education

Since primary education provides the first foundations of education and since a large number of children are discontinuing school at that stage, the Ministry of Education decided that SITE should concentrate on primary and pre-primary education and try to bring in some cheer and laughter in the classroom while providing core instruction.

At the primary level the main problems are wastage and stagnation. Of enrolled children, 40-50% drop out at the grade III stage and some more at grade IV. Besides economic and sociological factors which prompt parents in the weaker sections of society to withdraw their children from school, the dullness and boredom in the classrooms itself are powerful deterents. Primary schools in India, particularly in the villages, are beset with handicaps such as lack of teaching-learning aids, lack of trained teachers and other motivations that could make the school hours worthwhile and enjoyable. The overall result is that children drop out and lapse back into illiteracy, thus negating the inputs so far expended on them.

In SITE while the economic and sociological factors which dampen enthusiasm of parents could be taken note of in programmes broadcast to adult audiences in the evening transmission, programmes for children of the age group 5-12, broadcast in the morning hours, try to relieve the atmosphere of boredom in the school. These programmes also serve as an indirect in-service training to the village teacher and help him to professionally better equip himself.

The objective of these programmes is to make the process of education interesting, creative, purposeful and stimulating so as to improve its quality and reduce the incidence of wastage and stagnation; and to instill an awareness of the changing society and the motivation to respond to the change. The aim is to broadcast programmes for children in this age group during school hours that will (a) make them sensitive to and learn community living skills, (b) improve their basic concepts and skills in the areas of numeracy, language and technocracy, (c) instill habits of hygienic and healthy living, (d) promote aesthetic sensitivity and (e) make them aware of the process of modernization of life and society around them and the changes in resultant attitudes. The programmes while attempting to create a positive attitude to formal education, try to widen the children's

horizon and familiarize them with facts and matters normally beyond their observation and experience. The scope of the programme, therefore, consists of three main factors - attitudes, information, skills and habits.

Though the programmes are viewed collectively by children in the 5-12 age group, they cater to two distinct age groups - five to eight and nine to twelve on the basis of psychological needs and abilities which are different for these two audiences.

Broad outlines of the television syllabus were prepared by a committee of experts along with ETV producers, and the contents under each head in the syllabus were finalized by small Topic Committees.(1)

2. Agriculture

The broad outlines of the programme requirements, as suggested by the Ministry of Agriculture, are:

(a) dissemination of information (with demonstration wherever possible) on dry land farming, marginal farming, research findings in animal husbandry, poultry etc. relevant to the regions concerned, packages and practices recommended for important crops, seasonal crop operations and water management etc.;

(b) information relating to organizations responsible for inputs like seeds, fertilizers, implements, pesticides, credit facilities and other services etc.;

(c) pest and disease control; and

(d) weather forecasts and market trends.

Agricultural Institutes are collaborating in making some special programmes which could be dubbed in different languages and shown in all the clusters, thus reducing production time and costs.

3. Health, nutrition and population control

Motivation for acceptance of the small family norm cannot be achieved by raising the ghost of a population monster or from an isolated motivation by linking the small family norm and the welfare of the people in different spheres. This welfare must be perceived by the people themselves and not by the communicators alone. Therefore, unless motivation is built through services like education, health, improved methods of agriculture and structural changes in social systems, isolated family planning motivation may not yield expected results. Development as a whole cannot be fragmented and it is doubtful if motivations can be aroused for fragmental sectors. With this in view, programmes on family planning in SITE are integrated with those on health, social and economic development. Programmes try to focus attention on allied problems such as longer schooling, girls' education, need for greater participation by women in public life, including employment and recognition of women as an independent entity, the need for late marriage and genuine love for children. Radio and television should be used as a two-way traffic channel. To turn the 'participatory democracy' slogan into practice, SITE is trying to evolve participatory programmes to involve the people in genuine dialogue not only with each other but also with elected leaders and bureaucracy particularly at the Block and Village level.

Programmes on health, nutrition and population control are broadcast on 3 days a week. The duration of each programme is 10 minutes and the stress is on educational aspects in the field of:

(a) general health - preventive, promotive and curative;

(b) maternal and child health, including nutrition; and

(c) family planning.

The approach in all these subjects is determined in the light of the known socio-economic and health profile of the areas as a whole and, wherever possible, of specific cluster regions.

Some programmes are intended for change in attitude in matters concerning health, hygiene, nutrition, sanitation, child and maternal welfare and population control, while others are directly instructional.

There are special programmes for women (20 minutes) and children (30 minutes) each week and one programme (10 minutes) of special interest to the rural youth.(2)

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(1) Schedule for the week beginning 10 November 1975 (selected at random) will be found in Annex C. Some examples of utilization material appear in Annex D.

(2) Evening schedule in Annex C for the period 7-13 December 1975 (selected at random) for Bihar, Rajasthan and Madhya Pradesh clusters is indicative of the type of programmes put out in the evening transmission.

VI. Mechanics of programming

A. INTRODUCTION

The programme pattern for SITE has been developed in collaboration with the "user" agencies and keeping in mind the working and social conditions in Indian villages. The time available for community viewing in the evening is limited. A villager cannot afford to spend more than, say, two hours or so at the community centre. Keeping this in view, a composite format of two and a half hours duration has been planned for community viewing in the evening and one and a half hours during the day-time for primary schools.

In view of the payload of the satellite and the limitation of transmission time to 4 hours it was earlier proposed to group together programmes for some of the target areas. For example, programmes for Orissa and Madhya Pradesh would have a common picture with Oriya and Hindi on the audio channels; similarly, programmes for Karnataka and Andhra Pradesh would carry a common picture with two different languages. Programmes for Bihar and Rajasthan were to be put out independently.

AIR, however, was of the view that "this, perhaps, was not the ideal arrangement and might seriously cut into the credibility element. The off-screen commentary technique is not suited for an intimate medium like television. Dubbing has its own problems and limitations. Television, to be effective, must have a relevance to the environments of the audience. Programmes to be effective should not only be within the range of day-to-day experience of the audience but also in the local idiom". (1)

To compensate for some of these limitations imposed by use of two languages on the same picture and to provide maximum possible credibility under the circumstances, film field units were set up in the regions to be served by a common picture. These units feed local film inserts to the Base Production Centres at Hyderabad, (2) and Cuttack(3) for final production of programmes. As mentioned earlier programmes for Bihar and Rajasthan, produced at the Delhi Base Production Centre are put out independently with actuality material shot locally in those states.

The position was again reviewed in August 1974 when AIR once again stressed that "the commentary technique may serve the purpose in programmes on Health and Hygiene but is woefully inadequate in the transference of agricultural information. Coupling two language clusters together merely because there is a technical facility available would endanger effective communication which is the key factor in SITE. Experience has shown that unless there is involvement of the viewing audience through active participation in the programmes, the audience feels alienated and there is no sense of belonging. The one visual two audio situation puts several constraints on programmes and prevents a more intimate rapport between the medium and the audience. It is therefore imperative that the agricultural programmes be field-based and participation-oriented and as a rule in the language of the audience". (4)

It was finally agreed that all core programmes would be cluster-specific in the language of the region, with a brief commentary giving the gist of the programme on the second audio channel to keep up the interest of the audience in the other language region. Cultural and entertainment items like folk songs and plays etc. would be in the original language with a brief introduction in the other language

(1) Romesh Chander, Problems of Programming for SITE - Paper presented at the U.N. Panel Meeting on Satellite Instructional Television Systems, December 1972, New Delhi.

(2) For programmes directed to Andhra and Karnataka clusters.

(3) For programmes to be telecast for Orissa and Madhya Pradesh clusters. After 1 November, programmes for Madhya Pradesh were made at Delhi.

(4) Krishnamoorthy, P.V. AIR-ISRO Joint Working Group Meeting 13-14 August 1974.

on the second audio channel. This arrangement was to be followed for programmes in Kannada and Telegu for Karnataka and Andhra clusters and for Hindi and Oriya for Madhya Pradesh and Orissa clusters. The standard language in Bihar and Rajasthan is Hindi, but because of totally different agro-socio-economic conditions programmes for these two clusters are separate.

In addition to programmes of specific interest, all the clusters receive half an hour of common programmes, including news, in Hindi directed simultaneously to all the regions. This common programme is also rebroadcast simultaneously by VHF transmitters at Delhi, Amritsar and Nadiad (near Ahmedabad).

In light of the experience gained and some practical production difficulties a slight change was made after November, 1975. Programmes for Madhya Pradesh (Hindi) are no longer linked with those for Orissa (Oriya) produced at the Cuttack Base Production Centre. These programmes are now produced at the Delhi Base Production Centre. From the fixed-point chart Annex C it can be seen that viewers in Andhra - Karnataka clusters are exposed to a minimum of 70 minutes; in Rajasthan - Bihar - Madhya Pradesh to 90 minutes; and in Orissa to 50 minutes of community television every evening. And the children in viewing schools receive twenty-two and a half minutes of programmes in their own language on all working days. (1)

On the basis of a 4-hour transmission every day, except on the days when schools are not functioning, the total programme requirements for SITE are 1,326 hours as detailed below:

Evening transmission	366 x 2 1/2	= 915 hours
Morning transmission for schools	220 x 1 1/2	= 330 hours
Teacher Training Programmes (Morning transmission during holidays)	54 x 1 1/2	= 81 hours
	Total:	1,326 hours

Production has been decentralized in the three Base Production Centres at Delhi, Cuttack and Hyderabad. Each of the centres has a Production Studio, 3 IVC Tape Recorders, two 16 mm. Projectors and a Slide Projector in Telecine together with Audio equipment like Tape desks and Turn tables. On the film side, each centre has 2-3 full fledged Sync. Sound Camera Units, one Editing Table (Delhi has two) and a Film Processing Plant. Besides these there is a full fledged Sound Dubbing Studio equipped with a Pilot tone Recording Plant and Audio Mixing Console.

A considerable portion of the total programming is being produced or contributed by agencies other than AIR. Breakdown of the total production plan is as follows:

1.	Production by 3 Base Production Centres (both Studio and Film)	- 679 hours
2.	ISRO Production of Science Programmes (for schools)	= 33 hours
3.	20 Min. Common Prog. daily (Production: All VHF Stations)	= 122 hours
4.	10 Min. News daily (Production: Delhi TV Centre)	= 60 hours
5.	VHF Stations' contribution (other than common programmes)	= 20 hours
6.	Ready-made films from Films Division, Independent producers, State Governments etc.	= 150 hours
7.	Outside Producers on Special Assignments (Film)	= 50 hours
8.	Teacher Training Programmes in 3 language versions (Production: CET)	= 50 hours
9.	Repeat Programmes	= 162 hours
	Total:	1,326 hours

B. IMAGE PERCEPTION STUDY

The exposure to television, particularly in rural areas, in countries where there has been hardly any research in the field of Radio and Television will bring with it problems of perception and comprehension. The situation is totally different from the cities where cinema has become a part of everyday life. Perhaps in the earlier stages comprehension of the image itself and the association of movement with the picture on the screen may be a little difficult for people seldom or never exposed to visual media. Where moving images on TV screen are concerned, the illiterate farmer in the tribal areas of Madhya Pradesh or Orissa in India is in a comparable position to a child looking at a printed book for the first time.

In order to gain some insight into the problem and to determine the level of perception and comprehension of such persons, a pilot study was carried out before going into large-scale production of programmes for SITE. The objectives of the study, in general, were:

(i) To ascertain whether viewers regarded the images as real or only as pictures. In other words, to determine to what extent objects shown

(1) Since the medium of instruction in Rajasthan, Bihar and Madhya Pradesh, is Hindi, programmes directed to primary schools in these clusters are common; for Andhra the programmes are in Telugu, for Karnataka in Kannada and for Orissa in Oriya. The programmes for Andhra-Karnataka region are made in Hyderabad, for Orissa in Cuttack and Hindi programmes to be viewed simultaneously in Rajasthan, Bihar and Madhya Pradesh at the Delhi Base Production Centre.

on the screen and objects in real life are conceived as same or differently.

(ii) To find out to what extent objects shown on the screen are recognized.

(iii) To assess whether actions and sequences are understood and the logical sequence of events followed i.e. to find out whether sequences of different actions are understood by the subjects in time and space dimensions.

(iv) To find out whether use of techniques such as close-up, flash forward, animated cartoons, cut-ways, montage, dissolves, etc. are intelligible.

Eight illiterate persons who had never or seldom seen a film or TV programme selected from each of 16 electrified villages were exposed to programmes played on a TVC one-inch video-tape recorder in the selected villages. The latent assumption in confining the study to this category of population was that their level of perception and comprehension constituted the lowest common denominator among rural audiences. The difficulty experienced in imposing the constraints was that there were not many persons belonging to this category in the villages where the study was carried out. The villages had been visited by the mobile cinema vans of the Departments of Family Planning, Agriculture or Field Publicity at some time or another.(1) There were, however, some illiterate villagers who had never or seldom been exposed to films in these villages; but they were mostly persons over 60 years of age and whose faculties to an extent were impaired. Only eight farmers were therefore selected from each village. Each subject was interviewed by an investigator immediately after an exposure to each of the specially designed programmes, so that perception and comprehension were not affected by retention. Programmes were screened simultaneously on two separate monitors to two groups of subjects, sitting apart. Interaction between the subjects was thus eliminated.

In some villages programmes attracted unmanageable crowds rendering it difficult for the investigators to elicit the requisite information. In such cases, one monitor had to be placed outside to pacify the crowd. Responses of the subjects were recorded on a probe schedule which had been devised after pre-testing it in the field.

Field work was carried out from 27 December 1973 to 13 January 1974. A major bottleneck was the power crisis resulting in erratic supply of electricity in some of the villages. In some cases, farmers had to be brought to the Block headquarters for an exposure to the programmes. This brought some other problems in its wake. A rumour went round that showing of these programmes was a ruse to take the villagers to the Block headquarters for vasectomy operations. Perhaps the jeeps provided for transport of villagers were taken to be the proverbial trojan horse! At one place, to reassure the villagers, the Project Director offered to stay back in the village till the party returned from the Block headquarters.

Seven programmes were specially devised keeping the general objectives of the study in mind. Total duration of the package was about 40 minutes. While pre-testing the questionnaire, it was felt that two hours were a little too much for the subjects - 40 minutes for exposure to the programmes and about 80 minutes for probing, etc. To avoid the effect of fatigue, it was decided to introduce a brief interlude after the first 5 programmes in the package.

This is perhaps the first image perception study done in a developing country before introducing television to rural audiences. As such a brief description of some of the test programmes with conclusions drawn from the study may perhaps be of interest to sociologists and producers of educational programmes:

Baap Re Baap (Oh God!)
Duration: 7 minutes approximately.

An animated cartoon film on planned parenthood. The approach is indirect and subtle; the message is conveyed through two rural families - one with two children (happy and prosperous) and the other with four (miserable and poor).

The objective of the study was to find out whether the subjects recognized the characters as cartoon caricatures or images of real human beings and whether the message got across. Less than half of the respondents perceived the characters in the film as caricatures, the rest seemed to have been carried away by the anthropomorphic qualities of the characters, excellent animation and drawings. Judging from the facial expression and emotional behaviour registered by the respondents during the screening it was obvious that the humour fell flat - most of the respondents did not even smile much less laugh. On the other hand, one of the investigators stated that he burst out laughing every time he saw the cartoon - and he had seen the film at least 25 times. The behaviour of the respondents could be attributed to some extent to their being the centre of attraction; but according to the Project Director, it was mainly the result of their lack of familiarity with cartoons. Although no attempt was made to classify the respondents, to determine if the pace was too fast in relation to their personal speed of perception, the Report concludes that the pace was too fast for most of the subjects who appeared to lack the capacity to understand and adapt easily to rapid or sudden changes in the field of perception.

(1) The study was conducted in the villages of Uttar Pradesh and Haryana - both non-SITE states, about 40-60 miles from Delhi. The data, however, provided significant insight to the producers on the perception of rural audiences unexposed to cinema or television.

Dulhan Ka Gahana (Bride's Necklace)
Duration: 11 minutes approximately.

The story of a bride in whose mind a large family that has come to attend the wedding generates a chain of thoughts about her future if she too were to have many children. The imagination of the bride is shown through three intermittent flash forwards. The bride is reassured in the end when she notices the inverted triangle on the locket of the necklace which the bridegroom presents her.

The objectives of the programme were to gauge the ability of the subjects to perceive the flash forwards and their ability to perceive the red triangle as the family planning symbol, the change in the bride's mood towards the end and the reason for the change.

Only about 15% of the subjects perceived the flash forwards while an equal number perceived the red triangle. What is more, most of them did not associate the red triangle with family planning. Only 4 out of 128 subjects got the essential points of the programme while about half understood only a part of it.

Nehru: Duration: 2 minutes approximately.

A programme based on still photographs in which Nehru was first shown as dead and then alive. The theme of the programme was Nehru's love for children, animals, the tribes and his charismatic personality. The programme was designed to see whether the respondents could perceive the inversion of time sequence in television or film programmes. Almost all the respondents perceived the inversion of time; and those that failed thought Nehru was asleep or that he was ill. Interestingly, a large majority of those who perceived the time inversion felt that the death sequence should have been shown towards the end rather than the beginning. Mainly two reasons were advanced for this. Some felt that to show death at the end conforms to the chronological order of events in a man's life; and some others were against it on grounds of sentiment.

Ludhiana Mela (The Fair at Ludhiana)
Duration: 2 minutes approximately.

The presenter in the studio says that a fair was held in Ludhiana (he does not indicate that Ludhiana is nearly 350 kms from Delhi or that he was speaking from the studio) and invites the audience to accompany him to the fair. The programme based on a film shot earlier at the fair was designed to determine whether the subjects could perceive the sudden switch over in space.

When asked whether the fair was a past, current or a future event at the time when the presenter was speaking on the screen, only 17 out of 128 subjects felt that the fair was already over, but they failed to perceive that what they were seeing was a film shot earlier at the fair. To probe deeper subjects were asked whether the presenter was speaking from the fair or elsewhere. 7 out of every 10 subjects thought that the presenter was speaking from the fair. Perception in space dimension was absent in most of the subjects.

x x x x x

The following conclusions of the study have a significant bearing on the understanding of the process of perception of rural audiences unexposed to television or films: -

(a) The abrupt movement and fast cutting involved in cartoon animation production is detrimental to satisfactory comprehension of a serious message.

(b) Cut-aways, cuttings and inversions of time sequence tend to be acceptable. However, inversion of space dimensions introduce ambiguity in perception.

(c) Considerable credibility is attached to excathedra statements made by experts/presenters.

(d) Difficulty is experienced in comprehending flash-forward.

C. PRE-TESTING OF PROGRAMMES

India has extensive experience in rural radio, but SITE is the first time that TV programmes for large rural audiences have been undertaken. Before launching into production it was considered essential to obtain at the planning stage some insight of the effect of various programme components on as yet unexposed villagers. With this in view pre-SITE programme prototype testing was jointly undertaken by AIR's programme producers and ISRO's social scientists in the six SITE states.(1) The broad objectives of the pre-test were as follows.(2)

1. To assess interest in the test programmes.
2. (a) To investigate content comprehension. (b) To study reasons for lack of comprehension, viz., vocabulary difficulty, high verbalization rate, low novelty and utility of content, low credibility of message and/or its source, abstractness of topic, low-entertainment; high fact density.
3. To assess appropriateness of alternative programme formats, e.g., straight talk, discussion, documentary, dramatization, folk form, mime, song, animation, specific to: (a) Subject matter (family planning, health-hygiene-nutrition, agriculture). (b) Target audience.

(1) Due to unavoidable circumstances the study could not be on as large a scale as first envisaged.

(2) From ISRO's Reports on programmes produced by AIR for pre-testing in SITE clusters.

4. To compare information gain between the first, second and third programmes that form a capsule, i.e. is there a primary/sandwich-recency effect?

5. To compare the instructional impact of a more entertaining capsule with a less entertaining one.

6. To compare differences in learning between:

(a) a capsule with a "warm-up" opening programme that has local appeal (e.g. a folk song etc.);
(b) the same capsule without a "warm-up", but with the presenter's assurance that the programme will end with a "local appeal" item;
(c) the same capsule without a "local appeal" opening or ending.

7. To assess understanding of the audio-visual syntax of television.

The exercise involved actual community-viewing (as in SITE) of test programmes made for Rajasthan audiences and a study of villagers' comprehension of the fundamentals of the TV medium. A variety of programme presentation formats, persuasive appeals and sequences were investigated.

Trained research investigators observed subjects' viewing behaviour during exposure, and then interviewed each individual in the local dialect to explore the interest, comprehension, credibility, novelty and utility of the programme just seen. The intention was not to estimate or predict programme impact during SITE.

Ten illiterate adults or primary school children from each village were observed during the programme and interviewed after exposure to each programme. This meant that one interviewer had to be assigned to each subject. An interview guide listing the feedback aspects to be probed was given to each investigator for use after every programme.

On the basis of during-exposure observation, post-exposure in-depth interviews with individuals, and group discussions, the following conclusions may be drawn:

(1) Totally explicit unambiguous presentations in real-time sequence were found to be essential for full understanding - an approach that rules out flash backs and flash forwards. All connexions between shots must be clearly established visually.

(2) Real life portrayals are necessary for serious consideration of a programme - animated human figures were not seen as fellowmen.

(3) (a) The use of the local folk format was found extremely effective with children;
(b) Dramatization proved an involving and entertaining framework for information transfer;
(c) The exaggerated gestures and make-up in mime programmes were found offensive and contrary to the "grown-up" behavioural rôle expectations for adults;
(d) The long song format, though entertaining, failed to convey any of the information it was laden with, since the response to music seemed to be relaxation rather than concentration on words;
(e) Straight talk did not hold viewers' attention nor was it liked;
(f) The graphics format had low visual impact, evoked lukewarm interest and resulted in occasional erroneous identification of illustrations.

All this notwithstanding, no format may be considered always more effective for a given population and subject, irrespective of the quality of the individual production, which essentially determines its effectiveness. Given careless productions, the folk and play formats could well have proven to be flops.

(4) A "warm-up" opening song in a capsule was found to be definitely preferable to a similar finale - the latter created a mellow haze that resulted in the instructional impact of the previous programmes being completely forgotten.

(5) The second middle "sandwich" position in a half-hour capsule is not recommended for programmes without strong impact. When the three programmes in a single capsule are equally interesting, the order of their presentation (first, second or last) was not found important.

(6) Interest in programmes was chiefly determined by the entertainment value and the felt needs in agricultural education. Programmes on nutrition, public health or un-entertaining straight programmes on hygiene where the disadvantages of the status quo had not been perceived fared less well. Dissatisfaction has to be created with the present situation before pouring in solutions.

(7) Simple language of the region was found to be well understood and definitely preferable to instructional programming in dialects that vary from region to region in a single State.

(8) The younger section of a cluster's viewers who live within 20 kilometres of a town are frequent cinema goers. This has at least two implications for SITE programming:

(a) They do not have problems with flash-forwards or flash-backs etc. as they are familiar with the syntax of the film media.
(b) Their expectation of television is not entertainment (for which they prefer the city movie halls) but active assistance in improving their plight.

(9) Presenting different parts of the country to each other in SITE in an attempt towards integration appears to have success potential: Rajasthani folk songs and dances were liked in Bihar and in other cluster regions. These programmes aroused considerable curiousity about the regions of their origin. Appropriate information to this effect while introducing such programmes would be useful.

(10) The facts in a fairy-tale format create problems for children who do not seem to figure out where fantasy stops and facts begin. Some effective marriage of the two will have to be worked out in terms of programming.

(11) Agricultural programmes were appreciated most as directly relevant to local felt needs. Shots of actual field demonstrations were found most effective in communicating recommendations correctly.

Based on the programme pre-test study, major factors that will determine the successful utilization of programming in SITE are: low information load in very simple language, visual variety, humour and catchy music. Another very important point brought to light by the study is that viewer identification and involvement with the depicted problem, and, the featured sufferer-cum-problem solver must be created. Any suggestions for change must indicate the benefits for the individual. Bearing in mind low economic levels of the rural majority, it is not surprising that self interest, self welfare and self improvement are primary incentives. Community-consciousness is non-existent; the public interest will not serve as an impetus for any recommended action.

The results of this study have been a great help in figuring out the extent of identity between the meanings that an urban oriented producer (encoder) has for symbols, gestures, code and mode that he usually employs and the meanings, the village audience (decoder) associates with them.

D. DEVELOPING AUDIENCE PROFILES

An important step before going in for programme production is to gain a deeper understanding of the audience, its life styles, attitudes and behaviour. The programmes gain in credibility and impact if the audience is able to identify itself with the characters on the TV screen. This can happen only if the programmes reflect a true flavour of the life of the audience.

It was therefore considered important that the audience profile of each of the cluster areas be developed which can be used by programme producers for effective developmental programming. With this in view, an interdisciplinary group set up by the Central Institute of Indian Languages, Mysore and the Institute of Development Studies, University of Mysore was commissioned to prepare an audience profile for Karnataka - Andhra Pradesh region. Studies in other regions were conducted by the Research and Evaluation Cell (REC) of ISRO.

These studies are primarily concerned with the socio-economic and linguistic characteristics of the target areas. Major points tackled in the studies are: the composition of the audience: their socio-economic background; their interests; the problems they face in agriculture, health, nutrition and family planning, etc.; whether major developmental projects have had any impact - if not, why not; processes of social interaction between different strata of society; degree of participation in the community decision-making process; occupational distribution; educational level of the average viewer; communication problems and whether people understood the standard language of the region; socio and regional variations and commonalities in the region served by a common picture; and, of course, a host of other questions. (1)

The most detailed and exhaustive survey of all the 6 cluster profiles is the Report on the Karnataka - Andhra Pradesh clusters. As such, it is worth looking at its methodology and plan of action in some detail.

The interdisciplinary group responsible for the study identified the following activities pertinent to television for which feed forward would be necessary:

(1) Pilot survey:
including geographical, anthropological, psychological and linguistic data from the areas concerned.

(2) Content and Problem Identification:
as to agriculture, family planning, adult literacy, primary education and primary teacher training.

(3) Language Planning:
including communication analysis; dialect studies, commonalities and contrastive analysis, sample material production.

It was agreed that the study should concentrate on the composition of the audience, its social and economic background, its problems, major developmental projects that affect potential audiences, basic characteristics of the audience, occupational distribution, educational level and the interaction pattern among the people living in the border districts of the two States.

The group developed the following action plan:

Phase I - Analysis of the latest census data. Integration of village monographs and anthropological information: Integration of linguistic information: Report writing.

Phase II - Review of report from desk work: Identification of "benchmark" points. Reconnaissance trip. Recruitment of field investigators. Preparation of questionnaires.

Phase III - Data collection. Data processing. Report writing.

These profile studies are the first positive step in formative research in India as far as broadcasting is concerned. They provide a storehouse of information and could be of immense help to programme producers.

E. NEEDS ASSESSMENT STUDY

After gaining some understanding of the socio-economic and linguistic characteristics that determine the life of the potential audience in the target

(1) : Annex E gives a broad structure of the areas covered by these studies, and a résumé of one profile.

areas, the next step was to undertake needs assessment studies to ensure need-based programmes.(1)

The study was designed to find out which developmental schemes were running in agriculture, primary education, health and family planning in each of the SITE clusters, what was proposed for 1975-76, what were the problems in implementation, what were the villagers' most pressing needs and what were the caste and class differences prevailing in these villages. It was felt that this background would help the producer to make programmes that are relevant to local needs.(2)

Originally the study was planned in two parts. In the first stage a representative sample of villagers in SITE villages were to be interviewed. The second stage involved interviews with district to village level officials responsible for implementing schemes in areas of agriculture, primary education, health and family planning. Unfortunately, the first stage had to be dropped and the final "Reports are thus primarily based on interviews with officials in close and constant touch with SITE villagers".(3)

Besides listing the areas in which programmes could be most effective in each of the clusters, the study concludes as follows:

"On the one hand, the officials interviewed feel the masses do not come forward to make use of existing schemes that are under-exploited, and that their superstitious attitudes have to be changed towards modern practices, while, on the other hand, our own observation and previous research indicates that there is a lot of unsatisfied need for service due to schemes, officials and infrastructure not functioning as they should. Undoubtedly, there is some truth in both claims, and problems of one kind do affect the other. Here, a post-mortem attempt to determine whether the chicken was the effect of the egg or, the egg was the cause of the chicken, is inappropriate. The implication for SITE programme planners is that programmes will have to do two jobs: one, is to vitalize the infrastructure, and the other is to activate villagers. These dual objectives will need programmes that will inform villagers, mould their attitudes, and mobilize public opinion so that pressure for effective functioning of the agriculture, health, family planning, primary education, and social welfare machinery is exerted.

"The area in which information is most welcome to villagers is agriculture. The need is for very specific region-based advice - on how to get loans for minor irrigation, on which official to contact and by what date, on how to maximize output through labour-intensive methods given a majority of non-viable-sized land holdings, how-to-do-it tips, in short. These must be geared to making the most of limited resources. Proposals that have chances of adoption are those that are profitable in the short-run, easily implementable, culturally acceptable, and simple to understand.

"Through in-depth dramatic case-studies, an awareness of the importance of a scientific health, nutrition and family planning orientation will have to be spread, and the need for primary education created where non-existent.

"But, more important than any of these, the dependence on the government for all action must be demolished by explaining the incapacity of any institution to cope with the basic needs of all. Hence, TV programmes aimed at creating a "help yourself - organize" attitude are essential.

"Whatever the programme however, it must be highly specific so the villager can recognize the problem as his, and identify the suggested solution as locally possible. This dictates a mode of highly "federal" decentralized TV production that involves investigations and analysis on location, consultation with the professionals in each field, discussions with villagers and officials, and then programme-creation featuring alternative solutions that are realistic, relevant, and actionable for the average small farmer. Participation of villagers in production would ensure televised recommendations are feasible, as well as make for authenticity in the minds of the audience at the point of reception".(4)

F. SURVEY OF FILMS

A large number of educational and instructional films have been made in India. Some of these films would be relevant in SITE either independently or as inserts in studio-based programmes. But unfortunately detailed items of information, helpful to programme producers, are not available in the usual catalogues of film libraries. It was therefore decided to survey the existing material in order to build a centralized data bank of detailed information about these films.

The primary objective of storing the information in a centralized form has two elements: the first is to assist a producer in selecting a film or excerpts for a programme. The second is to provide a centralized data bank for purposes of studying the patterns of communication in terms of the basic assumptions of producers regarding the audience/community for which the films have been made. In view of the urgency of building up

(1) These studies were undertaken by the Research and Evaluation Cell, Space Applications Centre (ISRO).

(2) Needs Assessment Study (SITE/SSG/REC/017), ISRO Ahmedabad.

(3) Needs Assessment Study (SITE/SSG/REC/017), ISRO Ahmedabad.

(4) Needs Assessment Study (SITE/SSG/REC/017), ISRO Ahmedabad.

such a data bank for use before and during SITE, only one person was able to view each film. However, to reduce the biases of the individual observer to a minimum, previewers were given special training in the use of data sheets, that had been finalized after seeing 50 films and then pretesting them. A brief description is given in Table IV.

Table IV - Data sheet for Non-Science films

Subject:
Topic:
Source:

A. Content

(a) i. Film Title _____ ii. Duration _____
iii. Producer _____ iv. Year of Production ____
v. Language _____ vi. Colour /b and w

(b) Synopsis

B. Form

i. Setting	Rural	0	1	2	3	4	5
	Urban	0	1	2	3	4	5
	Semi-urban	0	1	2	3	4	5
	Any other (specify)	0	1	2	3	4	5
ii. Format	Demonstrative		1	2	3	4	5
	Story	0	1	2	3	4	5
	Reflective	0	1	2	3	4	5
	Any other (specify)	0	1	2	3	4	5

iii. Who are the characters
iv. Commentary/live
v. What is being said
vi. Does the film create direct involvement.

C. Usability
i. Instructional (Specify)
ii. In excerpts or in entirety
iii. Your suggestion of its use

D. Remarks.

G. INNOVATIVE PROGRAMMES

In SITE, India is hoping to try out new techniques and tools of programme production. Some experimentation with Super-8 and half-inch VTR is visualized. In collaboration with independent producers some very exciting innovative programmes have been undertaken. Contents of these programmes are in accordance with the planned schedules, but the producers have complete freedom of innovation, presentation and production techniques.

The Puppets[1], under the direction of a well-known designer Raghunath Goswami, in 3 short films for children have explored new techniques like silhouettes, shadow puppets, animation of still pictures and flat figure animation in place of conventional complex type of animation for achieving similar results at a much lower cost.

In their experiments with shadow puppets they have developed new techniques of manipulating shadow objects and special types of back lighting

(1) The Puppets, 6 Hastings Street, Calcutta is a coalition of designers, painters, modellers writers and musicians.

for achieving much freer movement of images, which has liberated shadow puppetry from some of its hereditary fetters and created a possibility of substituting for animation in film. Discussing the suitability of shadow technique in TV films Mr. Goswami says:

"In live action there is a certain loss of focus in televised image, and the greater the depth and detail in the original the greater the loss of quality in the transmitted image. The shadow puppet may lend itself to projection through television because it can offer action by simply-outlined characters made without moulding. Figures are flat surfaced and schematic in design.

It is useless and therefore uneconomic to try to be too subtle on the small electronic screen. The graphic effects must all be broad and clear, which one might find as inherent features in shadow puppet."

The techniques used by "The Puppets" have immense possibilities. Silhouette and flat-figure films, with their economical process of production are especially well adapted to the needs of the short film programmes for television. In fact, in the briefest kinds of films, these bold and simple animation techniques can quite well prove to be more effective than more complex forms of animation. In the silhouette film or flat figure animation as used by "The Puppets", animators can link the new art with ancient inheritance of shadow puppet in India and may well develop a new national tradition.

Perhaps one of the most innovative and interesting programming efforts in SITE is a series of 21 film modules, ranging from 1 to 12 minutes, produced by an eminent Indian film-maker Shyam Benegal and sponsored by UNICEF.

The modules are designed to give rural children an understanding of natural environment and to help them improve their basic concepts and skills in the areas of language and numeracy. The programmes broadly take into consideration the goals of primary school curricula but are not too closely patterned on them: they focus on a selected number of basic learning areas rather than being based on a comprehensive curricular structure.

The modules are in different formats. Some are straight live-action, using artists from travelling folk repertory companies. Others use different forms of simple animation. Since cell animation is very expensive, Shyam Benegal has used the simplest forms of animation: cut-out objects and puppets to keep down costs. The scripts, songs, rhymes and music are all of folk origin from Chattisgarh, one of the cluster areas in Madhya Pradesh.

A pre-production survey in Chattisgarh area showed that rural people do take to simple animation, because they themselves draw, design, do wall murals and caricatures both in drawing and sculpture. Animation works well with them because it has the ability of pinpointing the essentials much more sharply.

The drawing styles have been evolved from folk forms from different parts of the country. The survey also brought out that "you cannot do things that do not have real counterparts; for instance, if you draw a man, however much you abstract the man - you cannot - leave out his limbs. He will not be recognized. While this approach may not be necessary for the urban population, who are used to seeing abstractions from reality which do not correspond, you cannot do that with rural India. This is something basic. Whatever styles we used and we used a lot of decorative styles, we kept as close as possible to what they actually see in nature and around them. That is how we evolved the styles of animation". (1)

For better appreciation of the nature, content and form of these programmes a brief description of the modules is given below:

1. Kanjoos Bania - The Avaricious Tradesman
12 minutes, 14 seconds.

A miserly village grain merchant, stranded on a tree because of his cupidity, promises to reward a passing Brahmin with Rs. 50/- for rescuing him. When the Brahmin goes to his house to claim his money, the merchant shoos him away with a small coin. To get his revenge, the Brahmin, with a henchman, devised a strategem to work on the merchant's gullibility and extract much more money than the original reward. This is a live action story illustrating the moral of keeping your word and not being led away by greed. The narration of the story is through a folk song.

This particular story is from Chattisgarh but there are similar stories in other parts of India as well. They are all slightly different but the significant parts do not change. Therefore acceptability by audiences in other clusters would not be difficult, even if the programme has very specific regional characteristics as in this case.

2. Varsha - Rain - 4 minutes

The formation of clouds which produce rain is explained in simple terms through a folk song. This module uses simple cut-out animation.

3. Saat Din - Seven days of the week - 3 minutes

The seven days of the week described in terms of the presiding Hindu deity of the day, which gives each day its name, together with the characteristics of that deity. A popular folk-tale done in animation.

(1) From a transcript of interview between Mr. Gopal Dutia, Assistant Project Support Officer in UNICEF's New Delhi Office and Shyam Benegal.

4. Mankhe ki Kahani - Creation of Man
7 minutes

A puppet film about the creation of man by Lord Shiva, narrated through a Chattisgarh folk song. The naming and identification of parts of the body can be taught through this module.

5. Ek Gira, Do Ne Dekha - One Fell, Two Saw
2 minutes

This is a "numbers riddle". Numbers are related to actual things like eyes - we have two eyes; numbers related to fingers - we have ten fingers, numbers related to teeth - we have 32 teeth; and so on.

The programme helps teach numbers not in abstract terms, but as related to objects.

6. Aalsi Ram - Lazy Bones - 5 minutes

While two people are digging a well, the lazy chap exhorts them to work harder, though not helping out at all. When the workers are paid for their labour, he gets belligerent, demanding his share for the exhortation. A village Solomon arbitrates. A live action module illustrating that hard work is rewarded.

7. Reech Ka Baccha - The Bear Cub
4 minutes

Based on a well-known North Indian children's poem about a bear cub and his trainer, (1) a live action module with a song version of the poem as narration, develops a feeling for animals.

8. Bara Masa - Twelve Months of the Year
9 minutes

A cut-out animation module describing the twelve months of the year through the agricultural activity and festivals that occur in each month. Designed in such a way that it can be used for each month individually, or for the whole year.

9. Dabra - 2 minutes.

A live action riddle on the dialect names for parts of the human hand.

10. Main Khaun - Can I eat You? - 3 minutes

This cognitive value module based on a folk tale from Chattisgarh is done in a very amusing way. A man justifies his stealing by first asking the eatables he steals whether he can have their permission to eat them. He feels that on this basis he has not stolen anything. A funny live action module illustrates the moral that purloiners come to sticky ends.

11. Eklavya - 10 minutes

This is an adaptation from a well-known Mahabharata story. Eklavya was a low caste boy, prohibited from learning archery from a Brahmin mentor. Yearning to be a good archer, he fashioned a clay model of the Brahmin expert. Worshipping the statue he became a better archer than the redoubtable Arjuna, much to the dismay of the Brahmin, Dronacharya, who sought to keep the lower castes in their place by demanding Eklavya's right thumb by way of gurudakshina (a pupil's ritual present to his teacher on the completion of his instruction). Without hesitation, Ekalavya cuts off his thumb and offers it to his guru. This mythological story stresses unquestioning obedience in a class-structured society. The module questions this total acceptance and poses the question whether a teacher, or anybody in authority, has the right to destroy a hard-earned or self-acquired skill or knowledge.

This module is not only telling a story of social discrimination; the animation is like a comic book - with sentences written in thought - balloons to encourage children to read. This adds another dimension to the learning aspect.

The story is narrated in the popular local balladic form - Panwani, with a singer-actor miming the story.

12. Cup Basi - The Cup and the Saucer
8 minutes

A government officer comes to a traveller's bungalow and encounters a dumb servant. A humourous skit on object identification which ends with a simple exercise in choosing similar objects.

13. Masterji Ka Kutta - Masterji's Dog
4 minutes

A live action ridiculous riddle that is both mime-acted and spoken. The module not only tries to exercise the children's minds, but also to get them to act or use their body physically.

14. Patta aur Dhela - The leaf and the cloud
4 minutes

This is an object animation module done with simple and inexpensive photo animation to illustrate the advantages of co-operation and helping each other out in terms understandable to little children.

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(1) The poem is by a famous Urdu poet of the late eighteenth century, Nazir Akbarabadi, who wrote a large number of poems for children. Unfortunately recent textbooks have to an extent neglected his poems, but a generation ago anybody who learnt Hindi or Urdu at school would have learnt some of them.

The story also has a tragic dimension - everything succeeds only relatively. The narration is through a traditional folk song.

15. Ghera - The Circle - 4 minutes

Another simple animation module about the circle, what it is, how it can be drawn and what objects in everyday life have a circular shape. An important aspect of the module is that it helps one to recognize shapes, to be able to isolate them and pinpoint each shape. An entertaining song makes the explanation very lively.

16. Pahle, Baad Mein - Before and After - 1 min.

The concept of before and after, illustrated by two bumpkins crossing a small stream. The module is in the form of a skit.

17. Uphar, Neeche - Above and Below - 3 minutes

The concept of above and below as it affects two comedians lounging under a tree. This module too is in the form of a skit.

18. Ek, Do, Char - One, Two, Four - 5 minutes

A cut-out animation numbers riddle about a man and an umbrella which can also be used to illustrate parts of the human body.

19. Bayees Kaan - Twenty-two Ears - 2 minutes

A mythological numbers nonsense-riddle.

20. Magarmach aur Bandar - The Crocodile and the Monkey - 8 minutes

Story from Panchatantra of the monkey outwitting the dumb crocodile, who despite their friendship wanted to present the monkey's heart to his wife. Simple cut-out animation is used together with the panwani form of traditional folk song narration.

21. Sui Giri - The Needle Fell - 3 minutes

The module uses the concept of total absurdity, which is also important in the learning process, because it opens a lot of comic possibilities for children.(1)

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The film modules draw the learning elements from the local and regional material and use them in a new way - different from the way it has been used over a period of time. Like a proverb many of these things, told in the traditional way, are taken for granted. But the moment we start looking at them in a slightly different way, all the learning comes through very clearly. This is exactly what Shyam Benegal has tried to do in these programmes.

These modules can be used in various combinations in differing formats and with studio-based lead-ins and inserts. UNICEF's sponsorship of this project could well lead to "a series of low-cost module banks at major television stations, which would reduce the cost of producing individual TV programmes. The modules could be used again and again in different combinations and with occasional additions of new material. Carefully executed modules would have the life of good textbooks so that their initial cost would be spread out over a long period of time."(2)

If television is to be used as an instrument of social change, it should help the people actively to participate in the process of growth and change. It should involve the villager in a free dialogue with officials both at the grassroot level and in the higher echelons of government departments. In most developing countries this is perhaps easier said than done, as can be seen from a project that was attempted in one of the clusters.

The idea, to be implemented in 3 programmes, was to develop a dialogue on film between the villager and the officials. Local problems were to be filmed in depth, after editing with the help, if possible, of the local opinion leaders, played back to the officials dealing with the subjects under discussion and after filming their response, the two viewpoints with possible solutions were to be put together in each programme and put out for viewers in that cluster. The programmes were contracted to the Centre for Development of Instructional Technology (New Delhi) who were to make them with AIR's crew. CENDT's experience is interesting: In the beginning the villagers were rather reluctant to talk,(3) but once the ice was broken and the team able to establish their bonafides, some problems really affecting the community were recorded. The material was edited at the Base Production Centre. But unfortunately the programmes could not be completed due to the officials' reticence to reply or discuss on film the problems of the villagers.

(1) Shyam Benegal, the producer, rightly feels that the absurd is as important in life as the logical or the rational.

(2) Dutia, Gopal, Kid stuff - Modules for SITE-TV in India. UNICEF NEWS, issue 84/1975/2. United Nations Children's Fund, United Nations New York, N.Y. 10017.

(3) Most villagers felt that what they say might be considered as complaints against the officials who would sooner or later harass them.

Obviously, the "model" in this project was the Canadian "Challenge for Change".(1) But it should be remembered that the "Challenge for Change" programme was introduced at a period of time when their society had already reached a certain stage of development. CENDIT's experience in this project only goes to show that producers and programme planners must explore techniques suited to local conditions and avoid "models" made in conditions that may not be relevant.

The Space Applications Centre of ISRO at Ahmedabad has experimented with a somewhat similar idea in a series of programmes produced for Kheda district, with better results. This involves attempting to use the medium for two-way communication between villagers and decision makers. This programme - called "Vat Tamari" (Your Views) - has been immensely successful and has to its credit a number of specific achievements. It has helped villagers to solve many of their problems, has goaded the administration into being more responsive and has given the villagers an appreciation about the functioning of and constraints on the administration. The programme has also had some success in motivating villagers to do certain things on the basis of "success story" programmes about other villages. This series has been produced on half-inch portable video recorders.

Another interesting project in SITE was the production of 12 training films for primary school teachers designed mainly to illustrate the pedagogy of the new science course developed by the National Council of Educational Research and Training.(2)

Yet another area of programme production in which there has been considerable excitement is that of science programmes being made by SAC.(3) The programmes try to show science as a new way of observing and understanding commonplace things and everyday happenings. "With the village environment as the laboratory for these programmes science is no longer an esoteric activity confined within four walls with a blackboard, benches and apparatus. An attempt is being made to evolve an approach through which science would not be just an inorganic veneer on children's education, but become an organic part of their intellectual and social functioning as human beings".(4)

Since most of the teachers in the rural primary schools have not gone beyond the high school stage, these programmes are also an education for them. As one teacher in the Rajasthan cluster said: "Science is one subject that I dreaded most. I now realize that science is everywhere". The programmes try to emphasize the learning of scientific method rather than a mere transfer of information.

Before going in for production, SAC got together some science educators from leading educational and scientific institutions as well as programme producers and communication experts for a one-week workshop in Ahmedabad. The workshop prepared nearly 150 programme briefs. Each of these defines an objective for the programme, a take-off point from the familiar village surroundings, a description of the science content, and finally ends with some questions to ponder over. In these briefs there is no attempt to separate science into compartments of physics, chemistry, biology, etc.

This intensive exercise is the first gathering of science educators and producers not only to discuss but to actually work out details of individual programmes "to make children (and incidentally teachers) realize that science is everywhere, that their immediate environment can be questioned, understood, explained, and manipulated by them using the scientific method". The programmes were produced under the supervision of science educators who have had experience in innovation in science teaching and many of them have worked with schools in rural areas. Social scientists responsible for the evaluation of these programmes were associated right from the beginning, and pretested some of the pilot programmes before full-scale production was undertaken".(5)

These science programmes were produced at ISRO's Bombay SITE Studio, which is extremely small (about 7m x 8m) and sparsely equiped. It has only one 1" VTR and poor facilities. In spite of this, it has been doing a very good job, both in terms of quality and quantity. The production method is unique and involves a team effort with active collaboration between the producer, a science educationist, a communications researcher and a script writer. Science educationists were basically scientists deeply involved in education. Arrangements were made with a number of well-known institutions for use of their science educationists as science consultants.

In a survey of 3 villages in Rajasthan in November 1975, it was reported that 10 days after

(1) "Challenge for Change" is a Canadian experiment in the use of film to fight poverty. The programme is designed to provoke social change, to increase public understanding of social problems and to involve the community in solving them. The programme was evolved in 1967 by the National Film Board of Canada together with different government agencies. It also aims to examine the effectiveness of government schemes.

(2) For details of this project see Chapter VII.

(3) ISRO's Space Applications Centre which is producing about 33 hours of science programmes for the morning transmission.

(4) Yash Pal. UN/Unesco Regional Seminar on Satellite Broadcasting Systems for Education and Development, Mexico City, 2-11 September 1975.

(5) See section C of this chapter for details of pre-testing.

seeing the programme on how water is lifted from a well most children 8 to 10 years-old could explain the advantages of a pulley system over the rope and bucket system. In another village a 7 year-old child vividly recalled some sequences from the programme on snake bite seen some 6-7 days previously. In the same village older children who had earlier seen a programme on electrical energy could give a general explanation of how a thermal power station works and a younger group (age 7-8 years) remembered one or two examples of how electricity produces energy. (1)

Judging from the response to some of these programmes, the project has certainly been worthwhile and opens up new vistas for teaching of science through television and radio.

While experimentation with new tools of programme production like Super-8 and half-inch VTR had been visualized by AIR, it has not yet materialized. However, some work with inexpensive half-inch video-recorders, costing about $2,000 each, was done by ISRO.

In fact, as much as about 20 per cent of the programmes produced for the Pij transmitter by ISRO, were made on 1/2" video-tape. Experience so far has been extremely promising, particularly after some technical innovations by SAC engineers on the portable 1/2" video-cameras. The playback capability of this gauge and its low cost make it very economical to use. Some doubts were raised about its quality so a complete test was conducted intermixing 1/2", 1" tape and 16mm film. This test established the superiority of 1/2" tape over 16mm film.

Meanwhile, ISRO has produced a number of major programmes including plays, instructional programmes, etc. on 1/2" tape and the quality is indistinguishable from film.

H. UTILIZATION

Experience in many parts of the world has shown that while TV programmes can create awareness, motivate and convey information, actual adoption or action is greatly helped by on-the-spot follow-up. Programme support or utilization activities are therefore crucial to the success of a TV programme in terms of action.

In such a wide spread and limited duration experiment as SITE, it was recognized that it would be extremely difficult to carry out programme support activities in all 2,400 widespread villages. Yet, the experiment would be incomplete without an active utilization component. ISRO has therefore set up a small Utilization Cell, the primary function of which is to serve as a catelyst to activate the existing extension and other agencies in the SITE clusters.

In utilization, attempts have to be made:

to reinforce the message,
to provide additional information on the subject
to clarify doubts arising in the minds of the audience
to ensure availability of infrastructural support
to make adoption possible
to make attempts to solve problems if they arise in the implementation stage.

One block in each SITE cluster was selected for this effort and one Research assistant was posted in this block to interact with the Extension Agencies and the villagers so as to persuade them to direct their efforts towards a better understanding and implementation of the message. The chart in Figure IV gives an idea of the agencies and activity involved in utilization.

The support was planned to be in the form of printed material, group discussions, clarification by the experts, demonstrations and provision of physical inputs like seeds, fertilizers, insecticides, etc.

Through such an activity it is hoped to gain experience in trying to co-ordinate the activities of the various departments connected with Development and Extension and to learn the constraints in implementing such a package programme.

In each cluster, the Utilization man selects, in consultation with the local extension agents, certain topics for group discussions in the "utilization villages". A discussion between an extension expert and villagers is then arranged either on the day of the telecast or on the following day. For the purpose of this group discussion, "Charcha Mandals" (Discussion groups) have been formed in each of the utilization villages. Details about the discussion in these "Charcha Mandals" and the reaction of the expert on the programme are recorded in the formats shown in Annex F.

In addition to discussions with the experts, existing printed material or where possible new material on the topics of the broadcasts is also distributed in these villages. Demonstrations, film shows and physical inputs are also arranged through the various State agencies, whenever practicable.

Utilization activities for the morning transmission for school children include the printing of a wall paper to act primarily as support material for the science education programmes. This wall paper is prepared jointly by ISRO and the Vikram Sarabhai Community Science Centre. It is published in all the SITE languages and is sent to all the SITE villages.

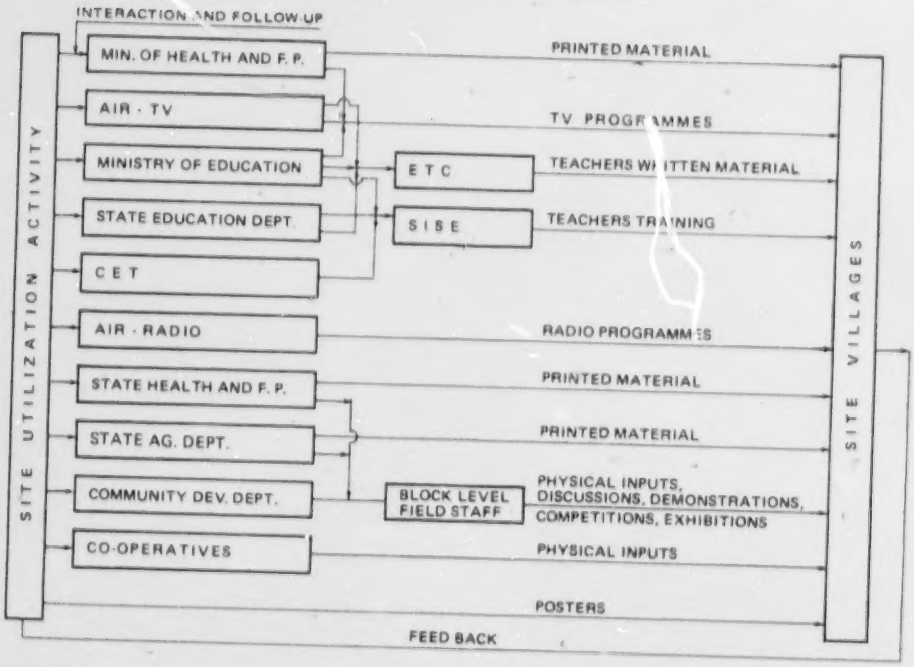
Another important programme-support activity for the morning transmissions is the preparation, printing and dissemination of teacher's notes

(1) Interestingly enough the train song in the programme on Children's Train (produced by AIR) was remembered by quite a few children in the age group 6-10 years but most of them could not recollect the working of a steam engine, the objective of the programme.

for all the programmes. These notes include a brief description of the programme and suggested pre- and post-telecast activities. The printing and distribution of these notes is handled by the Ministry of Education at the central and State levels.

In keeping with the experimental nature of SITE, the effect and implications of these utilization activities (and the absence of them) will be studied to determine the usefulness of this additional support to programmes. The results should prove to be of great help in the design of an effective programme support system.

Figure IV. Total utilization system



VII. In-service teacher training programme

A. BACKGROUND

With a view to develop a scientific atmosphere and attitude in the country, India has decided to make the study of science and mathematics compulsory in the schools. The content and methodology of the new curricula developed by the National Council of Educational Research and Training (NCERT) are different from the previous courses. This means that more than 1.7 million primary school teachers, teaching in grades I to V, have to be retrained. The new curricula are further handicapped because a vast majority of these teachers have themselves not studied science. Since many of these teachers live and work in rural areas, the problem of numbers is compounded by that of communication.

Traditional methods of training and orientation through workshops and short courses have proved time-consuming. It is in this context that the Centre for Educational Technology (CET), a wing of NCERT, has developed a multi-media package for training of primary school teachers in science. The package consists of television programmes, radio broadcasts, self-instructional and other printed enrichment materials for self-study and classroom experiments, and tutorials.

B. OBJECTIVE

The multi-media training package developed by CET has the following two main objectives:

(1) To familiarize the teacher trainees with the methodology associated with the teaching of science. The essential features of this pedagogy are:

(a) An enquiry approach to teaching based on the scientific method, which consists of posing a problem to the students based on observation, formulation of a hypothesis, designing of an experiment, collection and analysis of data and drawing conclusions in the light of the original hypothesis;

(b) An increased use of demonstrations and experiments in the class;

(c) Involvement of students at all stages of the lesson;

(d) Utilization of low cost or no cost apparatus for experiments and demonstrations;

(e) Helping children relate the lesson to their everyday environment.

(2) To up-grade teacher's knowledge and understanding of the content of the primary school science syllabus.

C. CONTENT

The multi-media package for the in-service training programme aims at improving the primary school teachers' competence both in pedagogy and content of science. The content of the training programme has been developed by CET in consultation with the Department of Education in Science and Mathematics at NCERT and the primary school syllabi of the six participating states in SITE. Only 12 topics as were common to these states were selected; of these, seven relate to physical sciences and five to biological sciences.

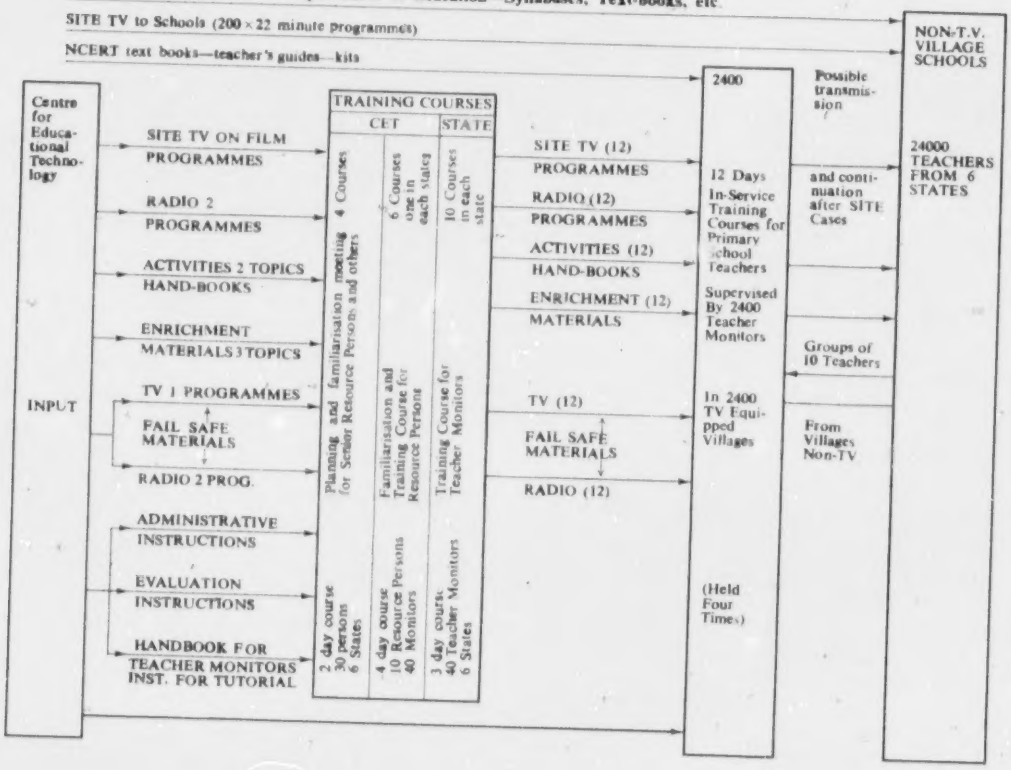
The 12-day schedule for this in-service teacher training programme is included in Annex C.(1) It is obvious that the entire primary school syllabus cannot be covered in 12 days; nevertheless, it covers considerable ground and according to the first reports, teachers' responses have been very encouraging.

D. TELEVISION COMPONENT OF THE MULTI-MEDIA PACKAGE

Twelve twenty-two and a half minute programmes have been designed mainly to illustrate the pedagogy

(1) The first training course was conducted from 16-27 October 1975.

Figure V.


Existing inputs from State Departments of Education—Syllabuses, Text-books, etc.
SITE TV to Schools (200 × 22 minute programmes)
NCERT text books—teacher's guides—kits
NON-T.V. VILLAGE SCHOOLS
Centre for Educational Technology
INPUT
SITE TV ON FILM PROGRAMMES
RADIO 2 PROGRAMMES
ACTIVITIES 2 TOPICS HAND-BOOKS
ENRICHMENT MATERIALS 3 TOPICS
TV 1 PROGRAMMES
FAIL SAFE MATERIALS
RADIO 2 PROG.
ADMINISTRATIVE INSTRUCTIONS
EVALUATION INSTRUCTIONS
HANDBOOK FOR TEACHER MONITORS INST. FOR TUTORIAL
TRAINING COURSES
CET
STATE
Planning and familiarisation meeting for Senior Resource Persons and others
4 Courses
2 day course 30 persons 6 States
6 Courses one in each state
Familiarisation and Training Course for Resource Persons
4 day course 10 Resource Persons 40 Monitors
10 Courses in each state
Training Course for Teacher Monitors
3 day cours. 40 Teacher Monitors 6 States
SITE TV (12) PROGRAMMES
RADIO (12) PROGRAMMES
ACTIVITIES (12) HAND-BOOKS
ENRICHMENT (12) MATERIALS
TV (12)
FAIL SAFE MATERIALS
RADIO (12)
2400
12 Days In-Service Training Courses for Primary School Teachers
Supervised By 2400 Teacher Monitors
In 2400 TV Equipped Villages
(Held Four Times)
Possible transmission
and continuation after SITE Cases
Groups of 10 Teachers
From Villages Non-TV
24000 TEACHERS FROM 6 STATES

of the new science course. Since the pedagogic principles cannot be taught in a vacuum, lessons based on the specific content of the syllabus are used. In this way, it is hoped that TV programmes will also provide opportunities of upgrading the teacher's knowledge and understanding of the subject matter.(1) The telecast is preceded by an introductory talk by the teacher-monitor, a specially trained resource person who supervises this training programme in the village. It is followed by a general discussion on the content of the programme.

These television programmes illustrate one or more pedagogical principles of teaching science, help the teacher to adopt new techniques of teaching science and assist them to comprehend, through visuals, some difficult parts of the content. Supplementary objectives are: to help the Centre for Educational Technology develop a software library in the form of educational films and video-tapes for training of teachers, which could be used by state Governments and other educational institution; to introduce teachers to the world of educational television and to familiarize them with its effective use.

Intentionally, comparatively difficult topics in the syllabus have been selected for these TV programmes, taking the opportunity of upgrading the teacher's knowledge and understanding of the subject matter.

The constraint of making all these programmes in the four languages used in SITE has been a handicap in making a full use of the medium. The teacher talks in the language of the original version, the students also answer in the language of the region where the films have been made, and for other language versions "voice over" has been used. In other words, the original sound track is first heard for a few seconds, the commentator's voice then takes over to explain the gist of what the teacher or students have been saying.

Detailed guidance notes on each programme were given to the teacher-monitors in advance.

(1) See Mulay, Vijay and Everest, A.S. A Project for a Multi-Media Package for the In-service Training of Primary School Teachers, New Delhi, National Council of Educational Research and Training.

The notes describe the objectives of the lesson, suggest pre-telecast and post-telecast activities, and give an overview of the programme.

India is the second largest film-producing country in the world, but the infrastructure for 16 mm. films is most inadequate. The use of 16 mm. films in schools or for teacher training is almost non-existent. Because of inadequate 16 mm. production facilities, CET were not sure that they would be able to complete all the films by the due date. So, stand-by programmes as "fail safe programmes" for each of the lessons had been prepared. The guidance notes sent in advance to the monitors gave full details of these materials as well as hints on how to conduct alternative activities in lieu of the TV programme.

E. TRAINING PROGRAMME

The in-service training programme has been organized in four series and each course will last 12 days. The first course was held from 16 to 27 October 1975 and the remaining three will be in May and June 1976 when the schools are closed for summer holidays. In the first course approximately 24,000 primary school teachers attended the seminars in 2,400 SITE villages. By June 1976 approximately 96,000 teachers will have had the benefit of this training at a cost much less than that of the traditional Summer Institutes.

The success of this programme to a large extent depends upon the teacher-monitor and his training is therefore very important. The training programme is made up of four stages:

(1) Planning and familiarization course for Senior Resource Personnel:
The objective of this course is to plan details - organizational and academic - for the training programmes and to familiarize those who are concerned with its implementation at state level in each of the six states, with the contents of the multi-media package.

(2) Training course for Resource Personnel:
One four-day course for ten Resource Persons to be run by CET in each of the six states. The resource persons thus trained will be responsible for training other teacher-monitors.

(3) Training camps for teacher-monitors:
The resource persons trained in (2) above will organize nine training camps each for 40 teacher-monitors, each lasting 3 days.

(4) In-service Training Course for Primary School Teachers:
Each teacher-monitor will conduct a 12-day multi-media training course in a TV village for ten teachers from TV and non-TV villages.

The above chart in Figure V shows the inputs and different stages of the training programme.

VIII. Social research and evaluation

A. INTRODUCTION

Since SITE is an experiment which is meant to provide vital inputs into the design and execution of a future on-going system, the evaluation of its impact assumes very great importance. As a controlled experiment it provides a unique opportunity for action research and for use of social science inputs in a real-life situation. The overall social research and evaluation design takes into account these factors and is geared to provide inputs at the planning stage as also to finally evaluate the impact of SITE. It is designed to give the policy-maker, programme producer or social scientist insights into the optimum ways of using TV to spur development in the given socio-economic and cultural situation.

B. ORGANIZATION

Social research for and evaluation of SITE is being done primarily by ISRO, which has a special SITE Research and Evaluation Cell (REC). This consists of about 100 persons, including 5 senior researchers at the REC headquarters (Ahmedabad) and a senior researcher in each of the SITE clusters. There are 4 research assistants posted to each of the clusters and some research assistants at Ahmedabad. In addition to other support staff, there are panels of research assistants who are employed for specific short periods for data collection, etc. A senior researcher is posted to work at ISRO's Bombay SITE Studio to provide research inputs for the production of science programmes for children.

The overall research design for SITE was evolved by REC in consultation with a number of persons within and outside ISRO and was finalized by the SITE Social Science Research Co-ordination Committee under the chairmanship of Dr. M. S. Gore, Director, Tata Institute of Social Sciences, Bombay. The Committee included representatives of ISRO and AIR, besides a number of eminent social scientists. For the large-scale survey to assess SITE impact on adults, a special Survey Research Group (Adults) has been set up under the chairmanship of Dr. Pradipto Roy. This Group evolved the detailed design for the survey and is overseeing the research operations.

SITE's impact on primary school children is being studied under a joint project involving ISRO and the National Council for Educational Research and Training (NCERT). A researcher from NCERT is playing the leading rôle in this project, even though field research assistants (18 in all) have been provided by ISRO. This kind of positive collaboration is helping to get the best professionals in the country involved in SITE research and evaluation.

To supplement the holistic studies being done by ISRO and to involve more professionals, two holistic studies have been contracted out by ISRO to A. N. Sinha Institute of Social Studies, Patna. These studies will be carried out by researchers from this Institute on the basis of ISRO's design.

The overall evaluation design can be broadly divided into three segments:

1. Formative or input research;
2. Process evaluation; and
3. Summative evaluation.

A general description of each of these segments is given in the following sections.

C. FORMATIVE OR INPUT RESEARCH

Input research began with detailed studies of the potential audience. These studies - Audience Profile surveys - were carried out in all the SITE clusters. Extensive data was collected from secondary sources on all aspects of the "target" population; their dress, habits, festivals, leisure time activities, economic activities, social customs, superstitions, demographic composition, etc. This was supplemented by data collected

through actual field visits for observation and interviews.(1)

As a prelude to the preparation of a programme plan, it was considered necessary to determine the actual needs, problems and priorities of the village audience. Accordingly, Needs Assessment Studies were undertaken in all the clusters. The plan was to carry out a two-stage operation: first to find out the villagers' needs as stated by him/her (felt-needs) and then to find out what according to the concerned district officials were the needs of the villagers (perceived needs). Detailed field work in this regard was done in many clusters, but unfortunately not all clusters could be covered in this level of detail. In spite of this, these studies have proved extremely useful for programme planning.

Apart from these "background" studies, a very important part of input research - and one not done earlier in India - has been the pre-testing of some programmes. The method adopted was to play back some programmes on one-inch or half-inch VTR in selected villages to audiences under simulated SITE viewing conditions. The audience was observed closely throughout the viewing sessions and asked questions about the programme after it was over.(2) The findings provided some interesting data to programme producers.

Given the tight time schedule and the constraints on production, it was clearly recognized that remaking a programme after pre-testing - though desirable - would be extremely difficult. The results have, however, been of great value in the production of future programmes. Pre-testing of programmes (particularly science education) has been done in all the clusters.

Apart from testing the programme itself, some script testing has also been done. This involved dramatized reading of the script to children and then getting their reactions. This has proved to be a cost-effective method of "pre-testing" since problems pertaining to the contents can be taken care of even before the programme is produced. The production by ISRO of science programmes for children has a very large research input. A full-time communication researcher works with the production team at Bombay right from the script stage and thus research inputs are a continuous rather than one-shot or periodic process.

Most of the pre-testing for ISRO's science programmes has been done in the various clusters. This involved difficult and complicated logistic operations. Very often, the mains power for the VTR and TV monitor went off at the crucial moment.

To avoid these problems, save time and money, a novel idea of using school children from a school on the outskirts of Bombay was tried. The same programme was shown to village children in the Orissa and Madhya Pradesh clusters, thus enabling "calibration" of the Bombay school children. Surprisingly, there is little difference between the results.

D. PROCESS EVALUATION

In an experiment with a lifetime of only one year, process evaluation can play only a limited rôle. Also, the nature of the experiment and its logistics dictate that programmes must be ready well before transmission - as much as one or two months earlier. Therefore, the scope for changes and modifications based on during-SITE research is necessarily limited. In spite of this, process evaluation has proved very useful not only to producers, but also to streamline field management of SITE.

Process evaluation for SITE consists primarily of the fairly large and extensive Feedback Study. This involves a total of 26 researchers in the field collecting data from a panel of over 100 villages on audience reactions to the programmes. Each researcher interviews 10 to 15 viewers on the day after they have seen the programme, thus making for a total of between 260 and 390 interviews from 26 villages. Four villages are covered by each researcher, thus ensuring that data comes in from as many different villages as possible.

Data is collected about reaction to the transmission as a whole, the best liked and most useful programmes, comprehension, language difficulty, perceived importance of the programmes etc. Specific answers are also sought regarding whether the programme was too long, too short or appropriate; on the rate of delivery; on reception quality, etc. The very large amount of data coming in is being coded and computer processed and the results presented to programme producers. The specific questions as well as reactions regarding comprehension, etc., are proving very useful to Producers.

Data is also being collected regarding the respondent's age, sex, education and occupation. This would be useful for analysis of differential impact and reaction to different programmes.

The 4 villages to be covered by each of the field researchers are reasonably close to each other, so that the researcher can cycle from one village to the next, though, in practice, collection of the data in some of the clusters - particularly in Bihar - has been rather difficult.

Though not formally planned to provide process evaluation data, some of the other research studies have, in fact, contributed considerably. Researchers in the field carrying out other studies (e.g. holistic studies) have been sending back data - mainly qualitative - which very usefully supplements the quantitative data from the feedback survey.

Within the first few months of SITE itself, in spite of a time lag, the Feedback Study has been able to provide concretely useful data on audience

(1) For detailed description of audience profile surveys see Chapter VI (D).

(2) For details see Chapter VI (C).

reactions to different types of programmes and different presentation formats. In later months, as more data becomes available and as the discriminatory ability of the audience surfaces, feedback should be able to provide even more interesting and useful results.

E. SUMMATIVE EVALUATION

Summative evaluation of SITE impact is sought to be done through different studies, each using a different technique. Among the major studies are the two large-scale impact surveys, one to assess the impact on adults and the second to study the effect (mainly of the morning educational programmes) on children.

The Impact Survey (Adults) will specifically study two areas:

(a) Evaluation of Knowledge, Attitude and Behaviour.

(b) Evaluation of TV exposure.

A baseline (T_0) survey was carried out just before SITE began; a mid-term (T_1) survey was planned for February-April 1976, and the final (T_2) survey will be carried out after SITE ends. Data collection in each cluster is realized on the basis of a survey instrument designed by the Survey Research Group and translated into local languages. Four men research assistants in each cluster are supplemented - during the actual data collection - by 2 women research assistants, particularly for collection of data from women in the villages.

The design consists of 12 experimental villages and 6 control villages in each cluster. In each of these villages, 72 respondents have been randomly selected from the population above the age of 15 years. Thus, about 8,000 interviews will be carried out during each phase of the survey. The large volume of data will be coded and computer processed at Ahmedabad.

To study the effect of school programmes on primary school children, SITE Impact Survey-Children (SIS-C) is being carried out as a joint ISRO-NCERT project. It involves getting responses from both children and adults. One district from each of the 6 direct reception clusters has been selected at random and six villages selected from each of these districts (at random again). Control villages have been so selected that TV is not within their reach - to achieve this a minimum distance of 8 km. from any TV village has been considered sufficient. The study is limited to assessing the impact on the age group 9 to 11 years and will specifically compare language development, classroom interaction and attitude to school in the experimental group (confined to grades III to V) with that of the control group.

A teacher's sample - from 20 experimental and 20 control villages - will be drawn from the same "experimental district" as the children sample. Teachers' attitudes will be studied both by comparing the Experimental Group with the Control Group, as well as by comparing pre-SITE responses with post-SITE responses.

Data collection for this study is being carried out during-SITE (in December 1975) and during the last 12 weeks of the school year in each state. For general objectives, specific hypotheses, data collection and data processing of the SITE Impact Survey Children (SIS-C) see Annex G.

Apart from these two impact surveys - which are basically quantitative - there is a qualitative anthropological study going on in all the SITE clusters. These holistic studies involve first-hand observation by an anthropologist who will be resident in a SITE village during the whole of SITE, besides having spent a few months there before SITE and staying on for about 3 months after SITE ends. The general objectives of these investigations are to study:

(a) the process of existing rural communication;

(b) the rôle of TV as a new medium of communication;

(c) the process of change brought about by TV in the rural structure at micro-level.

These studies will therefore provide valuable qualitative data on all aspects of SITE impact at the village level. In fact, reports from the anthropologists are already providing useful insights into the effect of TV and of particular programmes.

The basic design for these studies was discussed at a special Workshop held before SITE began to which eminent anthropologists from various Indian universities were invited. As mentioned earlier, ISRO has also contracted 2 holistic studies to the A.N. Sinha Institute of Social Studies, which has placed one of its researchers in a Bihar village and another in Rajasthan. They will supplement the work done by ISRO anthropologists in other villages of the SITE clusters.

A special study has been designed to analyse the content of the programmes. This Message System Analysis study will describe and compare the characteristics of the various programmes (morning, evening, 2-audio, single audio, etc.). It will seek to analyse the causes or antecedents of the different kinds of programmes and the effects of these on their respective audiences. Data collection will be done "on-line": i.e., the programme contents will be coded by researchers by viewing the actual transmission itself.

A number of small in-depth studies are also being carried out to explore and gain insights into the process and impact of communication. Each of these in-depth studies is being done in one or - at most - two of the clusters.

Reports from most of these evaluation studies are expected by December, 1976. The results will then be consolidated into an overall social evaluation report which should be an extremely useful document not only for future TV and communication planning in India, but also as a possible guide to other countries.

IX. Technical evaluation

A. INTRODUCTION

The technical evaluation of SITE is very important as an input for future systems. Any future satellite-based system will be different in one major aspect - the down-link frequency will not be in the 860 MHz band due to international regulations regarding frequencies for satellite broadcasting. There are, however, a large number of very important technical parameters, decisions on which will be influenced by the evaluation of SITE. Analysis of data collected during SITE will provide an evaluation of many systems, sub-systems and operation procedures.

B. EARTH STATIONS

Each major sub-system of the earth stations was separately tested and evaluated before SITE. The purpose was to ensure that all sub-systems met at least the minimum specifications necessary. Later, the earth station at Ahmedabad was tested as a complete system. The first part of this testing was done using the spacecraft simulator loaned from NASA. This provided the confidence that all the equipment was basically correct and compatible with the spacecraft. Later, as part of the further testing, the Indian Ocean INTELSAT spacecraft was used. This enabled not only a checkout of the complete station with an operating spacecraft, but also provided an opportunity of evaluating the indigenously developed equipment against INTELSAT requirements and standards.

Finally, pre-SITE testing was done using the ATS-6 as soon as it came over the horizon and within view of Ahmedabad. Testing with the ATS-6 countinued until SITE began and is now conducted at specified times.

Present data collection includes down-time of each major sub-system and an analysis of the reasons for the failure. Experience so far has indicated that a majority of the problems are due to the fluctuations in voltage and occasional breakdowns in the electric mains supply. In spite of these problems, the reliability of earth station equipment in the first few months of the operation of SITE has been approximately 99.95%.

Apart from evaluating the performance of the equipment itself, an evaluation will also be made regarding the development phase - e.g. what is the quantum of manpower required, what time schedules are feasible, what is the minimum test equipment required, etc. Some of this data should prove to be useful to other developing nations.

C. DIRECT RECEPTION SYSTEM

The direct reception system (DRS) has undergone many evaluations, both as a system and in its main elements. Thus, the 3m antenna, the front-end converter and the TV set have all undergone testing separately and together. As part of the testing, the TV set was evaluated at the British Aircraft Corporation within the framework of the UNDP/ITU project. This evaluation resulted in a number of concrete suggestions and many of these were implemented for the SITE sets.

The front-end was subjected to testing both in India and at NASA in USA. The 3m antenna too has been through a lot of testing, and as a result its design was partially modified.

The DRS as a whole was tested with the spacecraft even while the ATS-6 itself was under testing. The aim was to establish compatibility between the DRS and the satellite. Following this, and after further testing in India, a DRS was set up in the USA after the launch of the ATS-6 to check out its operation with the satellite in orbit. This confirmed that the system was working. Later, further tests were carried out with the satellite when it came within view of the country.

Probably the most interesting data on DRS now is related to maintenance. Data on failures is being collected from all the clusters and an analysis of the first 1,800 failures has been carried out. This indicates the type and frequency of various

faults and this will be invaluable for the design of future DRS units. The information system for flow of data from clusters to Ahmedabad has been streamlined, and analysis will be done by computer.

D. EXPERIMENTS

The ATS-6 has a S-band transponder on-board. Since a future domestic satellite system for TV in India is likely to operate in this band, it was decided that an evaluation of system performance in this range was necessary. Accordingly, an experiment has been designed to look at the propagation aspects at S-band. The experiment is carried out once a fortnight by sending C-band signals to the satellite and receiving at S-band. The antenna and receiver required for this purpose have been developed and fabricated at ISRO and are working well.

An evaluation of the Audio-2 channel is also being done since this is a technical innovation which could be of considerable importance in a future operational satellite TV system in India.

V. International collaboration

Space research is one of those fields where co-operative international effort has been a reality for some time. In fact, space technology very often necessitates co-operation between different countries. SITE is itself an excellent example of international collaboration.

Even preceding the actual signing of the agreement with NASA, a joint ISRO (then a part of the Department of Atomic Energy) -NASA Working Group was formed to study the possibility of using a synchronous communications satellite for TV coverage of India. It was this collaborative effort which was the seed of SITE. After the signing of the SITE Memorandum of Understanding, the regular ISRO-NASA review meetings on SITE contributed greatly to a feeling of mutual collaboration and co-operation. Some Indian engineers were sent to NASA to gain work experience in various areas including development of the front-end converter and earth station operations. This helped greatly in the final development of various systems and sub-systems in India. Stationing of an Indian Resident Representative in NASA and vice versa has also been very helpful in continuing the close relationship between the two organizations.

UN and other international bodies have also contributed in many ways towards SITE. The first important step was the assistance of about $500,000 provided by the United Nations Development Programme (UNDP) in 1965 for the setting up of the Experimental Satellite Communications Earth Station (ESCES) at Ahmedabad. UNDP nominated the International Telecommunications Union (ITU) as the executing agency for this project.

After the completion of this project, UNDP has provided further assistance totalling about $1.5 million for the ESCES Expansion Project which includes assistance for the TV studio at Ahmedabad and the TV transmitter at Pij, besides work connected with the earth station itself. ITU is again the executing agency.

UNDP has provided considerable assistance to two other SITE-related projects in India for which Unesco was the executing agency. One is the TV Training Institute (now part of the Film and TV Institute of India) which helped train many of the programme production staff now working in All India Radio studios for SITE. The other is a project with the Centre for Educational Technology and is just beginning.

In terms of technology development within the country, the UNDP/ITU assistance for the ESCES Expansion Project has been invaluable. Using the test equipment and expertise available as a result of this project, it was possible to develop and fabricate all the major earth station equipment within the country itself. As a result of the fellowships provided and the expertise made available by UNDP/ITU through sub-contracts, "know-how" for all earth station equipment now exists in India.

Another example of fruitful international collaboration for SITE was the decision by the INTELSAT organization to agree to India's request for providing satellite (INTELSAT) time free for carrying out some tests. This testing was done in May 1975 before the ATS-6 came within view of India, and was an extremely important part of the pre-SITE system checkout of the Ahmedabad earth station.

UNICEF has contributed to the SITE programming effort by sponsoring a service of 21 film modules (approximate total duration 100 min.) produced by an eminent Indian film-maker, Shyam Benegal.

The modules are in the broad area of cognitive development and non-formal education of rural children between 5 and 8 years of age.(1)

An unexpected result of UNICEF's sponsorship of this project has been the interaction between sophisticated film-makers and folk artists working in their own environment. Shyam Benegal subsequently used many of these artists in his children's feature film Charandas Chor, which has already been released in cinema theatres all over the country.

(1) For further details see chapter VI (G).

ANNEX A

India - U.S. site agreement (1)

Basic purpose:

To conduct an experiment in the use of ATS-F for direct broadcasts to rural community receivers and limited re-diffusion through VHF transmitters of Indian-developed instructional TV programme material.

General objectives:

The general objectives of the experiment are to:

Gain experience in the development, testing and management of a satellite-based instructional television system particularly in rural areas and to determine optimal system parameters.

Demonstrate the potential value of satellite technology in the rapid development of effective mass communications in developing countries.

Demonstrate the potential value of satellite TV broadcasts in the practical instruction of village inhabitants.

Stimulate national development in India, with important managerial, economic, technological and social implications.

Instructional objectives:

The Indian instructional objectives are in the fields of family planning, agriculture, national integration, education, teacher training, etc.

Indian technical objectives:

Provide a system test of satellite TV broadcasts for national development.

Enhance capability in the design, manufacture, deployment, installation, operation, movement and maintenance of village TV receivers.

Gain experience in the design, manufacture, installation, operation and maintenance of broadcast and/or distribution facilities to the extent that these are used in the experiment.

Gain an opportunity to determine optimum receiver density, distribution, and scheduling, techniques of audience attraction and organization, and to solve problems involved in developing, preparing, presenting and transmitting TV programme material.

USA technical objectives:

Test the design and functioning of an efficient, medium-power, wide-band space-borne FM transmitter, operating in the 800-900 MH_Z band and gain experience on the utility of this space application.

Indian responsibilities:

Co-ordination of frequencies
Programme Production
Transmission from earth station to satellite
Installation of direct receivers
Development of evaluation plan and its execution
Dissemination of results of Experiment.

U.S. reponsibility:

Provision of experiment time on Satellite for approximately one year.

Indian Scientific Responsibilities:

Develop, provide and maintain in service the ground segment of the TV satellite experiment system that will carry out the technical objectives of the experiment.

(1) Memorandum of understanding between the Department of Atomic Energy of the Government of India and the United States National Aeronautics and Space Administration. Signed on 19 September 1969.

Develop and utilize ITV programme materials that will carry out the instructional objectives of the experiment.

Develop and implement a mutually acceptable experiment evaluation plan.

Prepare and publish interim progress reports at six-month intervals and a final report within 18 months of the end of the experiment.

Make available trainees for such training as may be agreed to between Programme Managers.

Receive, record, reduce and analyze such ancillary engineering data as may be agreed between Programme Managers.

U.S. Scientific Responsibilities:

The USA will use its best efforts to:

Place into geostationary orbit an experimental Applications Technology Satellite (ATS-F), position it within view of India after a period of time, to be determined by NASA, but not greater than one year, and maintain it on station for approximately one year. The time required of the ITV experiment, which is hoped to be about 6 hours a day, will be made available for the experiment during this period as NASA continues its own experimental effort using the satellite. It is recognized that in practice power limitations in the satellite may require a reduction in the time available to approximately 4 hours.

Provide to the DAE such training and consultative services as may be agreed to between Programme Managers.

ANNEX B

Earth stations and rediffusion facilities

A. PROFILE OF FACILITIES

The original plan for SITE called for 3 receive and transmit earth stations (at Ahmedabad, Bombay and Delhi) and a receive-only earth station at Srinagar, each connected to an existing or planned TV transmitter. Due to financial constraints, the earth station at Bombay was eliminated. It was also decided that the receive-only station should be set up at Amritsar rather than Srinagar. The original plan had not envisaged any limited rebroadcast (LRB) facilities. Later, it was proposed to set up LRB stations at Sambalpur in Orissa and Muzzafarpur in Bihar. Due to financial constraints, this plan too was dropped; instead, it was decided that a LRB would be set up at Sriharikota in Andhra Pradesh to cover ISRO's SHAR Centre, and a Mobile LRB would also be made.

B. AHMEDABAD EARTH STATION

The Experimental Satellite Communications Earth Station (ESCES) at Ahmedabad is the prime earth station for SITE. As the Earth Stations Operations Control Centre, it maintains direct contact with NASA and the ATS Operations Control Centre in the USA through dedicated voice and teletype links. It is also connected to Delhi by dedicated communications links (both voice and teletype). A Special Data Link has been set up via the ATS-F between Ahmedabad and NASA's satellite telemetry and command station from SITE at Madrid. This link, which has a VHF uplink and C-Band down link, will be used only when there is an emergency and the dedicated links are not functioning.

While the ATS-F is a "stationary" (relative to the earth) satellite, there is yet some small relative movement with respect to the earth. Though this small movement does not affect the Direct Reception System, the pointing of the earth station transmit antennas have to be periodically changed. Range and range-rate measurement equipment to help determine the exact location of the satellite has been installed at Ahmedabad. This data is provided to NASA to help determine the exact orbit of the satellite and to predict its position. Pointing of the transmit antennas at Ahmedabad and Delhi is based on these predictions. Actual optimization of pointing is done by monitoring the return signal from the satellite. The Ahmedabad earth station also has the facility for programmed tracking of the satellite using a computer. Use of programmed tracking has led to better optimization of antenna pointing.

The Ahmedabad earth station which was originally set up with help from the United Nations Development Programme (UNDP) was an experimental station that could also serve as a training facility. It had 6 GH_z transmit capability, using a 14_m diameter solid parabolic antenna and a 5 kw amplifier; and receive capability in the 4 GH_z band through the same antenna. To serve as the prime earth station for SITE, it required completely new receive and transmit chains, a separate antenna for receiving, a computer for programme tracking etc. These augmentations and modifications were carried out, again, with UNDP assistance. Complete development work including development of 3 kw High Power Amplifiers at 6 GH_z, Low Noise Amplifiers at 860 MH_z, up and down converters, baseband equipment, etc, fabrication, system integration and testing of all these additional sub-systems was done in India. The station now has two receive and two transmit chains (one operating and one standby) besides the older 5 kw chain - thus providing complete redundancy for all equipment, and excellent insurance against unexpected breakdowns.

The successful working of these units is a major technological breakthrough for India, particularly since these systems have been tested against INTELSAT standards. A special 6_m diameter chicken-mesh antenna was also designed and fabricated in the Space Applications Centre (SAC) itself for use as the 860 MH_z receive antenna for the Ahmedabad earth station.

C. PIJ TV TRANSMITTER

The Ahmedabad earth station is connected to a 1kw TV transmitter at Pij (about 50 km from Ahmedabad) through a cable-cum-microwave link. From the earth station-studio complex, the signal is sent to the microwave terminal of Posts and Telegraph (a distance of about 4 km) by cable and from there to Pij by a specially made microwave link. Thus, Pij is able to receive and rebroadcast programmes received via the satellite and also those recorded and played back from the Studio at Ahmedabad.

A unique feature of the Pij transmitter is that it already has around it more than 500 community TV sets; about half these have been financed by the large milk co-operative in the Kheda district. Another special feature is that it is India's first rural TV transmitter with a focus on rural programmes.

D. AMRITSAR EARTH STATION AND TV TRANSMITTER

A 6m antenna and LNA, similar to the one at Ahmedabad, have been installed at Amritsar to serve as the receive only earth station. Since this has been co-located with the terrestrial TV transmitter, there is no necessity for a microwave link. This receive only earth station requires only one engineer and 3 technicians to look after it.

The 10 kw TV transmitter at Amritsar has a fairly large coverage area, programmes being picked up by many sets in rural areas. The TV station rebroadcasts the half-hour common programme received via satellite from Delhi.

E. DELHI EARTH STATION AND TV TRANSMITTER

As development of the necessary equipment for the Ahmedabad earth station was proceeding, enough confidence was generated to decide that all the equipment for the Delhi earth station would be fabricated indigenously. In view of the tight time schedule, this was a major decision with considerable implications. The Delhi earth station was being set up to meet three main requirements:

(1) to broadcast "live" the news everyday as part of a 30 minute "common" programme to be received by all clusters and rebroadcast areas;

(2) to broadcast live important national events from Delhi;

(3) to serve as a back-up for the Ahmedabad earth station.

Thus, any delay in setting up this station, or any problems with it would not only upset the programme content of SITE but also affect the total system.

The first problem was the site itself. Finding a suitable location in such a radio-noisy place as Delhi was no easy task. Extensive noise surveys were undertaken; it was found that trees provide a good radio-shield and so finally a wooded area was selected.

While the fabrication of all the electronic equipment was well on schedule, there were some delays in the civil construction work. However, the major problem was that the 10m diameter solid antenna system, contracted to a large manufacturing organization, was slipping behind schedule. A decision was made to go ahead with a second antenna as a contingency measure and fabrication was contracted out to various small manufacturers under close supervision of ISRO. The antenna system was completed in a record time of about 5 months and the total station was ready about 20 days ahead of schedule, allowing for enough time for check-out with the satellite.

The experience here, once again, was that the older technologies like construction or simple fabrication pose more problems than the advanced technology of microwave communication. Even in the older technologies, the main problems were in areas such as procurement of steel, aluminium, cement, etc, rather than in design or fabrication. Inevitably, the critical path was always the procurement of raw material.

The Delhi earth station is connected with the studio/TV transmitter through a cable link. The distance is about 5 km. The 10 kw transmitter covers a fairly large area around Delhi.

F. TEST AND EVALUATION OF EARTH STATIONS

The equipment for the earth stations at Amritsar, Ahmedabad and Delhi was inspected and passed by an independent test and evaluation group. The Ahmedabad station was also tested by using the spacecraft simulator loaned by NASA for a few weeks. This equipment basically simulates the satellite's communication system and the earth station equipment was tested for compatibility with the simulator. The simulator was also used for testing the DRS for compatibility by going through the earth station - simulator - DRS link.

Tests with ATS-F began as soon as the satellite came over the horizon for Ahmedabad, on 13 June 1975. Prior to this, some tests had also been carried out with INTELSAT over the Indian Ocean. These tests were made possible as a result of INTELSAT agreeing to an Indian request for testing time on a no-charge basis. The Delhi earth station carried out complete tests from 3 July, the day the station became operational.

G. MONOPULSE BEACON STATION

A monopulse beacon station has been set up at Nagpur. This station serves as a back-up for the

Attitude Control System (ACS) on-board the spacecraft and can put out a beacon in S-band to help the satellite point exactly at Nagpur, which is the beam-centre. The station will be used only if the spacecraft ACS has problems. All the equipment for the Nagpur station was developed and fabricated in the country.

Dedicated communications links (both voice and teletype) have been hired between Nagpur and Ahmedabad. These will really be necessary only if the beacon station has to take over from the spacecraft ACS. However, the teletype is useful for contact with the Madhya Pradesh and Orissa clusters, communication from which is routed through Nagpur.

H. LIMITED REBROADCAST (LRB) FACILITIES

The Sriharikota LRB consists of a low power 15 watts TV transmitter which receives the satellite signal through a 4.5$_m$ diameter chicken-mesh antenna and a low-noise (about 3 dB) front-end. The transmitting antenna is mounted on a 20$_m$ tower. A similar receive system - with the signal being fed into a TV set instead of a TV transmitter - has been presented by ISRO to Mr. Arthur Clarke in Sri Lanka. This receiving system - which could be considered a "sophisticated DRS" - is necessary because the location is at the - 10 dB point and hence the signal strength is weaker than in the SITE clusters.

In fact, in areas of high signal strength, even the 3$_m$ antenna provides very good quality. This was proved through an experiment carried out on 15 August, India's Independence Day. The ceremonies were televised live from the Red Fort Delhi, using an Outdoor Broadcast van. The programme was sent live to the Delhi TV studio, from there to the Delhi earth station, and on to the satellite which then broadcast it. These signals were picked up at Bombay and Calcutta (places where there is no earth station) by a 3$_m$ antenna specially installed for the purpose. A low noise (3 dB) front-end processed the signals which were then rebroadcast by the TV transmitters. Thus for the first time an important national event in Delhi was telecast live in real time by both Bombay and Calcutta by using merely a slightly-improved (3 dB instead of 6 dB front-end) DRS, which was set up in just 2 days.

Though not conceived of in the original plan, the Mobile Limited Rebroadcast (MLRB) system is another interesting component of SITE. It consists of a low-power (15 watts) TV transmitter mounted inside a van. A 3$_m$ chicken-mesh antenna is carried in dismantled condition and can be mounted on the van when required. The antenna is connected to a 3 dB front-end, the output of which can be fed to the TV transmitter or to a TV set. The van can thus serve as a mobile DRS or for transmitting the received signal over a small area. The TV transmitting antenna is carried in the van and, whenever necessary, can be mounted atop the van on a 4$_m$ telescoping pole. The van also carries the necessary test equipment, etc. The MLRB began touring around various parts of India immediately after the monsoon - i.e. around October. It was for use at various educational institutions (agricultural colleges, engineering colleges, teacher-training institutions, etc.), and also possibly at large fairs and at science conferences, etc.

ANNEX C

Programme schedules

FIXED POINT CHART (EVENING TRANSMISSION)
WINTER SCHEDULE (1 NOVEMBER - 31 MARCH)

TIME (P.M.)		6:00	7:00	7:30		7:50 - 8:30
DAY	MINS	BIHAR/MADHYA PRADESH/ RAJASTHAN	COMMON PROGRAMME	ORISSA		ANDHRA/KARNATAKA
MONDAY	10	Agriculture (MP)	N	10	Agriculture	10 Agriculture (Andhra)
	20	Cultural (MP/Bihar/Rajasthan)				10 Cultural Entertainment (Urdu)
	10	Health	E			10 Cultural Entertainment (Karnataka)
	15	General Education/ Information (Film)	W	10	Cultural	10 General Education Community Matters (Karnataka)
	5	Short Film	S			
TUESDAY	10	Agriculture (Bihar)				10 Health, Nutrition, Hygiene, Family Planning (Andhra)
	30	Play	A	10	Agriculture	
	10	Youth	N	10	Cultural	10 Cultural Entertainment (Karnataka)
	5	Cultural	D			
	5	General Information				20 SKIT Play (Andhra)
WEDNESDAY	10	Agriculture (Rajasthan)	C	10	Women's Programme (Health, Nutrition, Family Planning)	10 Agriculture (Karnataka)
	20	Cultural (Bihar/MP/Rajasthan)	O			10 Cultural Entertainment (Andhra)
	10	Health, Family Planning, Nutrition (Repeat Programme)	M M	10	Cultural	10 Cultural Entertainment (Urdu)
	10	Cultural Programme from other Centres	O			10 Indian News Review
	10	Indian News Review	N			

THURSDAY	10	Health, Nutrition	P	10	Agriculture	10	Health, Nutrition, Hygiene, Family Planning (Andhra/ Karnataka)
	30	Women's Programme	R			20	Women's Programme (Andhra/ Karnataka)
	15	Development and General Education (Films)	O			10	Programmes from other Centres
	5	Cultural					
FRIDAY	10	Agriculture (Common-Repeat				10	Agriculture (Andhra/Karnataka)
	20	Cultural (Bihar/MP/Rajasthan)	G	20	Play	10	Cultural Entertainment (Andhra)
	20	Development and General Education (Films)	R			10	Cultural Entertainment (Karnataka)
	10	Health and Family Planning	A M			10	Youth (Andhra/Karnataka)
	5	Cultural Programme from other States	M				
	5	Short Film	E				
SATURDAY	10	General Education common matters				10	Health, Nutrition, Hygiene, Family Planning (Karnataka)
	20	Cultural (Bihar/MP/Rajasthan)		20	Children's Programme alternating with fortnightly Indian newsreel	10	Cultural Entertainment (Andhra)
	25	Development and General education				20	SKIT Play (Karnataka)
	5	Topical Hints on Agriculture					
SUNDAY	30	Children's Programme		10	Health, Family Planning, Nutrition, Development and General Education	30	Children's Programme (Andhra/ Karnataka)
	25	Play				10	Documentary (Film)
	5	Topical Hints on General Health		10	Cultural Programme		

EVENING SCHEDULES, RAJASTHAN-BIHAR-MADHYA PRADESH CLUSTERS

7-13 December 1975

(TRANSMISSION TIMING: 6.00 PM to 7.00 PM)

7.12.75 (SUNDAY)

Children's Programme
'Wqath Ki Baat' - Play
Shabad Kirtan (Sikh devotional songs)

8.12.75 (MONDAY)

HEALTH: Diet for Ulcer Patients
Folk Song from Rajasthan
Tribal Folk Dance from Bihar
'Swasthya Raksha' - (Your health) - Film)

AGRICULTURE: First Protection and After-care of Winter Paddy
Folk Song from Haryana

9.12.75 (TUESDAY)

AGRICULTURE:
(a) Mango Diseases and Control
(b) Poultry for Profit
Hasaya Geet Bihar (Humorous song from Bihar)
Kajri[1] - Uttar Pradesh
Yoga
'Rural Credit' - Film
Angochha (Mime)
Folk Song from Rajasthan

10.12.75 (WEDNESDAY)

AGRICULTURE: Sun Flower Cultivation
Chemical Weed Control
Bhajan (Devotional Song)
Folk Dance of Bengal
Bhartiya Samachar Chitra (Newsreel)
'Narak - Swarg' (Hell and Heaven) Film
Folk Dhun (Folk Tune)

11.12.75 (THURSDAY)

HEALTH: Paushtik Roti (Diet for good health)
Women's Programme:
Papier mache
Bhajan (Devotional Song)
Dandiya Ras (Folk Dance)
'Gangu Teli' - Film

12.12.75 (FRIDAY)

AGRICULTURE: Wheat Pests and their Control
Folk Song from Rajasthan
Folk Song from Bihar
Pong Challam (Dance from Manipur)
'Mahatma' - Serial film
'Sita Aur Saleem' - Film
Care of Winter Vegetables (Agri.)
'Farming the Mountain' - Film
"Harnessing"

13.12.75 SATURDAY

Domestic Pests and their Control
Bihari Lok Geet (Folk Song from Bihar)
Folk Song from Bengal
'Parallel Lines' - Film

IRRIGATION:

Rabi Crops Part - I

(1) Kajri is a musical form from Uttar Pradesh.

SCHOOL SCHEDULES 10-15 NOVEMBER 1975

DAY	DATE	TOPIC
Monday	10.11.75	(a) Energy Conversion - Electricity
		(b) How should water be lifted
Tuesday	11.11.75	Ram Lila - III
Wednesday	12.11.75	The Village Blacksmith
		Story of Iron
Thursday	13.11.75	Electrical Energy
		Snake Bite
Friday	14.11.75	Chacha Nehru
Saturday	15.11.75	Children's train

Teachers' Training Programme Schedule
(16-27 October 1975)

Date	Television	Radio	Activities	Enrichment Material
1. Thursday 16 Oct.	Introductory Programme "Let children learn science by doing."	Satellite Technology and in-service teacher training course	Air Pressure	1. Learning Science 2. Air Pressure
2. Friday 17 Oct.	Using environment for teaching science, topic for illustration - "Air pressure".	Shadows	Our Universe	Our Universe
3. Saturday 18 Oct.	Use of Models. Topic for illustration "Earth is very big and round."	Science is doing	Field Trip	Symmetry in Nature
4. Sunday 19 Oct.	Using the steps of teaching science, forming and testing hypothesis. Topic for illustration "Water - three states."	Water and life	Living things and seed germination	Adaptation to environment and evolution
5. Monday 20 Oct.	Continuation of Programme No. 4, but testing hypothesis leading to measurement. Topic for illustration - "Why things float?"	Edited comments by teachers on TV programmes	Force	Force-leading to power and energy
6. Tuesday 21 Oct.	Rôle of classification in teaching science. Topic "Living and non-living."	Hand	Five Senses	Five Senses
7. Wednesday 22 Oct.	Mental models are sometimes necessary in teaching science. Topic for illustration "Transmission of heat".	Edited comments by teachers on TV programmes	Three states of matter	Different categories of models
8. Thursday 23 Oct.	Importance of project work and questioning techniques	Projects by children	Food contamination and preservation	How children form concepts. Questioning for communication.

9.	Friday 24 Oct.	Demonstration lesson in biological science on "plant life."	Dr. Jagdish Chandra Bose	Use of plants	Tree of Wealth - cocoanut
10.	Saturday 25 Oct.	Demonstration lesson in physical science on "Measurement of length and need of stand unit."	Time	Measurement of length and area	Volume
11.	Sunday 26 Oct.	Improvization in science teaching	The story of the wheel	Simple machine	Some more improvization relating to more difficult topic e.g. heat
12.	Monday 27 Oct.	Introducing the NCERT. New syllabus in nutrition and health	Edited comments by teachers on TV programmes	Purification of water	Flies and Mosquitoes

ANNEX D

Material for school programmes

10-12 NOVEMBER 1975

Date of telecast: 10.11.75 - ISRO Production

Topic:

Shakti Roopantar - Part II
(Energy Conversion - Electricity)

Objective:

Electricity is a form of energy. Energy is of various kinds i.e. chemical, heat etc. One kind can be converted to another.

Pre-telecast activity:

(a) Observe the different uses of electricity in your village.
(b) Trace the route of the electric wire from the pole, outside or in the field, into the house.

Programme content:

Studio based production; using live models of a mini-generator to explain the idea of electricity being a form of energy.

Use of charts to reinforce the various energy conversions that take place in a thermal power plant, i.e. from chemical to heat, to mechanical and to electrical energy and vice versa.

Use of stills to show the purpose and use of the accumulater battery (wet-cell) in motor vehicles. Different types of cells and accumulators used for converting chemical energy into electrical energy. Demonstration of various uses.

Post telecast activity:

(a) Food can be converted into energy in men, animals - which they use for work (i.e. mechanical energy).
(b) Sun is the source of all energy. Ask children to observe in how many ways this energy is used around them. Give them an idea about solar energy.
(c) Ask them to conduct the experiment with a dry cell, mini-bulb (1-5 watt bulb) and connecting wires.

Date of telecast: 10.11.75 - ISRO Production

Topic:

Kaise Kheechen Pani (How should water be lifted?)

Science Content:

When water is drawn from a well using only a rope and bucket, the bucket cannot be drawn up continuously or too frequently because the person drawing it soon gets tired.

The pulley system is an improvement over the rope and bucket system because the pulling action is made in a downward direction, which is more convenient. The pulley merely changes the direction of the pull; the effort used though is the same as in the rope-bucket system. The counterweight system is used when the water level is not much lower than the ground level. The longer arm of this system has a rope and a bucket attached to it, and on the shorter arm is the stone counterweight. Weight of the stone helps to draw the bucket full of water and reduces the amount of effort that a person has to use.

The principle of levers is used here. In the "rehat" (Persian Wheel) system the bullock can employ more force than a man, so more water can be lifted from the well; and since a series of buckets are used, water pours out in a constant flow.

In each case the choice of system employed is determined by the level of the source and the amount of water required to be lifted. The degree of mechanization of the system depends upon the amount of water to be lifted - more the requirement, greater the mechanization.

Pre-telecast Activity:

Familiarize the children with the various methods of lifting water in their village. Ask them if they have seen any other method.

Programme content:

Bhayya, Chhotu's elder brother, shows Chhotu some methods of lifting water from its source. He exposes Chhotu to the pulley system, the simple rope and bucket system, and the "rehat" (Persian Wheel) system, all of which are used to draw water from wells. The counter-weight system is used to lift water from the streams. Bhayya describes in detail each of these systems, with Chhotu trying his hand at drawing water.

Post telecast activity:

The teacher should construct a simple lever with small sticks, as shown in the programme and explain its working. With straw or dried hay stalks, needles or pins children may be asked to construct their own lever and also a balance.

Date of telecast: 11.11.75

Topic:

Ram Lila, Parts I, II and III

Objective:

1. To introduce the great classic Ramayana to children.
2. To develop in children an appreciation of good values, such as bravery, co-operation, social equality and respect for elders.
3. To explain the significance of "Vijya Dashmi" and "Deepawali" festivals.

Pre-telecast activity:

Help the children to recapitulate the scenes from Ramayana programmes that they have already seen in the evening transmission.

Programme content:

The children may have already seen parts of Ram Lila in the evening transmission (telecast from 5.10.75 to 14.10.75 on the occasion of "Vijya Dashmi". Many of them would be even familiar with stories from Ramayana. In this programme, the following scenes from the Ramayana have been shown.

1. Rama's birth.
2. Rama and his brothers under training and education with the great teacher, Vashishta.
3. Rama and Lakshmana's stay with the Saint Vishwamitra.
4. Sita Swembra (wedding).
5. Rama's exile and the events that follow.
6. Fight with Ravana.
7. Rama's coronation.

Post-telecast activity:

Discuss with the children what they have seen in the programmes elucidating the following aspects:

1. During the Ramayana period, children were given training in all the arts including archery. This training was given by the Gurus (Teacher) in the ashramas (traditional residential schools).
2. Ultimate victory of good over evil.
3. Love among brothers as in the case of Rama and his brothers, should transcend material considerations.
4. Under no circumstances should ideals and principles be sacrificed.

Date of telecast: 12.11.75

Topic:

The Village Blacksmith - The story of iron.

Objectives:

1. To enable the children to discover different uses of Iron and Steel.
2. To acquaint them with the life and culture of a tribe whose main occupation is extracting iron from iron ore.

Pre-telecast activities:

The children may be told about the theme of the programme.

Programme content:

The programme opens with a mime on the work of a blacksmith. The presenter then explains the various sources of iron. In the next sequence, the life and activities of a tribe in Orissa are shown. Their main occupation is to extract iron from iron ore. The various processes in the smelting of iron ore are also shown. Some examples from history are given to illustrate the craftsmanship and skill of Indian artisans of the past. The next sequence shows how steel is made.

Post-telecast activity:

1. Divide the children into two groups. The first group should be asked to name articles of iron used in the daily life but usually made by the village blacksmith. The second group should identify the articles of iron but manufactured in factories.

2. Discuss the following with children:
   (i) The sources of iron ore;
   (ii) The process of extracting iron from ore;
   (iii) Uses of iron in our daily life.

3. Children's attention may be drawn to the dress, customs, and vocation etc. of the tribals shown in the programme.

4. Ask some children to mime as shown in the programme.

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ANNEX E

Audience profile research

INFORMATION NEEDED FOR PROGRAMME PRODUCTION - GENERAL

1. Food:

Food consumed regularly i.e. staple food and supplementary food. Food consumed on religious days or festival days, whether special food consumed by special categories like sick, ill, pregnant women, infants, children etc.? Values attached to food, customs related to food.

2. Social customs:

Social customs prevalent, customs related to birth, marriage, death, divorce, marriage systems.

3. Festivals:

Festivals observed, significance of each of them; how is the festival celibrated.

4. General:

Transport, animals used for mechanical transport.
Family system, joint or unitary, whether joint family is breaking up, reasons thereof.
Training systems, trading facilities.
Immigration to cities, reasons thereof and attitudes of villagers to it, of young and old.
Topography, weather, geographically important things to be made note of.
Games played, entertainment - its place in their life.
Superstitions.
Symbols, whether they are widely understood.
Occupational break-up.
Mother tongue - languages known.
Income - levels.

5. Agriculture:

Level of acceptance of new methods and techniques and tools for all agricultural operations.
Extent of the spread of Extension Services Information sources available like Block Development Officer and Village Level Worker, etc.
Availability of inputs when required, difficulties arising out of non-availability.
Attitude towards new methods and techniques meant for agricultural development.
Land tenures, general attitude towards them.
Labour-wages, housing conditions, terms and nature of employment, methods of payment.
Rural credit system, money lenders, co-operative societies, their rôle, how effectively they perform it, people's reaction to it.
Festivals related to different agricultural operations.

6. Health and hygiene:

Awareness of relationship of food and nutrition to health.
Acceptance of concept of prevention by way of vaccination, innoculation, clean living condition, food, ritual or worship.
Superstitions regarding health hazards, diseases.
Government agencies available. Hospital, clinic dispensary. Quality of personnel, availability of personnel and medicines and equipment needed.
Availability of private medical practitioners like doctor, Vaid or Hakim (practioners of indigenous systems of medicine), quacks, midwife.
Attitude of people towards government or private medical practioners.
Concept of cleanliness, housing conditions, drainage facilities.
Streets in the villages whether Kachcha or Pucca or cobbled.
Bathing, use of soap, frequency etc.
Lavatories, special care taken during epidemics.
Medical facilities - facilities for delivering babies - usage of modern facilities.

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7. Family Planning:

Age of marriage.
Number of children desired; need for a son.
Number of living children. Number of births.
Awareness about Family Planning as a concept, awareness of its utility, awareness about its essentiality. Knowledge of Family Planning Methods.
Attitude towards Family Planning; psychological religious and cultural background of these attitudes; attitude towards those who practice Family Planning.
Presence of Family Planning agencies; their efficiency. People's attitude towards Family Planning agencies.

x x x x x

A RESUME OF THE AUDIENCE PROFILE STUDY CONDUCTED BY THE CENTRAL INSTITUTE OF INDIAN LANGUAGES, MYSORE AND THE INSTITUTE OF DEVELOPMENT STUDIES, UNIVERSITY OF MYSORE. (1)

The Audience Profile Study reports the results of research to investigate how the socio-economic and language profile reflects change in the society and how it determines the contents and format of SITE programmes for Karnataka - Andhra Pradesh clusters.

The proposed area - Karnataka and Andhra Pradesh - is deficient in resources (except in certain valuable minerals) and as such is backward in the sense that the development has been tardy. The life cycle of the people and the productive forces have been influenced tremendously by the rhythm in nature. The result of this influence has been a low rate of progress in agriculture, low standard of living, etc. Added to this, the size and growth rate of the population, together with the social institutions, have been eroding the fruits of the little development made by forcing the society to use a high proportion of limited resources to maintain the existing low standard of living. A vast majority of the population lives in poverty. It is, therefore, necessary that our development plans for the areas should take into account these factors which call for specific development strategies. As psychological mal-adjustment impedes socio-economic progress in the area, something must also be done to improve the adjustment behaviour of the people.

The progress, the study points out, has been tardy because the developmental thrusts have not been adequate to bring about rapid development. And the unfavourable natural environment leading to droughts, marked under-utilization of resources for rapid development, inadequacy of the agricultural infrastructure have been responsible for the slow progress.

As such, the future development of the region appears to depend on the break-through in agriculture and agro-industries using local and regional resources. It also appears that the time has come when our planning has to be oriented to the man rather than sectors. This means that disparities in socio-economic development among groups and individuals and the basic problems of the society should be tackled before the problems of the sectors. TV programmes should, therefore, lay emphasis on man and his environment and his development. Programmes should focus on man as the means as well as the end product of planning and development of sectors.

The language profile presents the difference between standard Kannada or Telugu and the kind of Kannada or Telugu spoken in the study area in terms of linguistic features. Linguistically the study area is homogeneous within the context of the language of the state in the sense that the regions share certain non-standard features. Within the region there are socially correlated linguistic differences, which, however, do not seem to be as marked in the Telugu area as in the Kannada area. The language profile also describes the linguistic features of Urdu as spoken in the study area. It discusses the degree of intelligibility of the standard variety to the speakers of the non-standard varieties. Intelligibility of the standard variety has positive correlation with the level of education and the place of caste in the social hierarchy and negative correlation with age. The language profile also describes the attitude of the non-standard dialect speakers towards the standard dialect. People consider the standard dialect as prestigious and 'purer' than their own variety and wish to be fluent in it.

The study recommends the use of local dialects for different types of programmes, and advocates the use of different dialects by different characters in the same programme since this is the linguistic reality of the area, where people have been living with multiple codes, and have acquired skills to switch codes. It is thus not necessary to shy away from using local dialects which reflect the local verbal culture.

(1) Extracted from a note presented by Dr. D.P. Pattanayak to the meeting of Key Administrators on Systems Approach to SITE; Mysore, 27-30 June 1974.

Since good TV must depend on the visual language, linguistic peculiarities of the area may not, therefore, be a major problem; they can even be an advantage.

Experts usually formulate plans within the context of their own value system and thus make mistakes in planning for a people who may have a different value system. It is, therefore necessary that the content and format of the SITE programmes should be planned keeping in view the value system, the interest and needs of the people of the regions concerned.

India is a multilingual and multicultural country with a common linguistic and cultural pattern at the core. People with different linguistic and cultural backgrounds have been interacting with each other for a very long time resulting in imperceptible changes in their perception, behaviour and value system. SITE should aim at accelerating this interaction and change and at preserving simultaneously the regional cultural identity.

ANNEX F

Evaluation reports

EXPERT'S REPORT ON TV PROGRAMME

Cluster _____

Title of Programmes _____

Name of the village _____

Date of telecast _____

1. Main points covered in the programme:

2. General comments on the programme:

3. Please describe the shortcomings (if any) in the information given:

4. Kindly give your suggestions for improvement of the programme:

ANNEX G

Impact survey

PROGRAMME ASSESSMENT

1.	Programme utility	:	Useful/Not useful
2.	Programme presentation	:	Interesting/Not interesting
3.	Programme comprehension	:	Easy to comprehend/difficult to comprehend
4.	Programme duration	:	Too long/Too short/Sufficient
5.	Information content	:	Timely/Untimely
6.	Information content	:	Too much/Too little/O. K.
7.	Language	:	Fully understandable/Not understandable/partly understandable
8.	Technical/English words used	:	Many/A few/Not at all
9.	Time taken in discussing the subject	:	Sufficient/Insufficient/O. K.
10.	Speed of speaking	:	Fast/Slow/O. K.

Date: _____ ____

Signature: _____

GROUP DISCUSSION REPORT

STATE
VILLAGE

TITLE OF PROGRAMME
DATE OF TELECAST
DATE OF GROUP DISCUSSION
TIME OF GROUP DISCUSSION
NO. OF PARTICIPANTS PRESENT MALE
FEMALE

PROGRAMME:

1. Main Points mentioned in the programme:
2. Comments on the programme:
3. Comments on the viewing situation:

GROUP DISCUSSION:

4. Your observations about the Group Discussion (interest of the expert, involvement of the villagers, other issues)
5. Questions raised by the participants:

SUPPORT MATERIAL:

6. Was any printed material available on the topic? Yes/No
7. Was the material distributed ? Yes/No
   If yes, describe.
8. Was any visual or any supporting material used by the expert for explanation? Yes/No.
   If yes, describe.
9. Any other relevant information and remarks.
10. Participants:
    Names of the participants. Position, if any, held in the village.

Date: Signature:

NOTE ON GENERAL OBJECTIVES, HYPOTHESES AND METHODOLOGY OF THE SITE IMPACT SURVEY - CHILDREN (SIS - C)

One of the objectives of SITE is to contribute towards informed learning of children. For children in deprived environments, TV programmes can be seen as a series of stimuli which are likely to motivate the child to learn from his environment. Some behaviour modifications will take place. If the children's actions and reactions change, the interaction of the adults with children may also change. On the other hand, the medium is new and exciting. What will the children in rural areas be able to imbibe from it?

General objectives:

1. To study changes in behaviour, attitudes and cognitive development of primary school children exposed to SITE programmes.
2. To study changes in behaviour, attitudes and teaching strategies of teachers of schools where SITE programmes are shown.
3. To compare the impact of these programmes on different grades.
4. To study the difference in impact in different regions.

Specific Hypotheses:

Children who are exposed to SITE programmes will
(i) attend school more regularly;
(ii) acquire greater knowledge of their surroundings and the world in general; greater awareness of general hygiene;
(iii) show gain in language development;
(iv) show more interest in acquiring knowledge;
(v) Have more interaction with teachers and peer group;
(vi) show better achievement in their mother tongue, social studies and general science;
(vii) have a more favourable attitude to school learning.

Teachers who are exposed to SITE programmes will
(i) improve their attitude towards their occupation and children;
(ii) take more interest in their job.

Data collection:

The following tools will be administered:

School Information Schedule
Teacher Information Schedule
Student Personal Data Sheet
Classroom Interaction
Observation Schedule
Teacher Attitude Scale
Student Attitude Scale
Tests of Language Development for Children
Social Studies, and General Science.

Pre-experiment data will be collected from 1 July to 14 August, during SITE data from 1-31 December and post-experiment data during the last twelve weeks of the school year in each state (January-February-March 1976).

Data processing:

Some of the data will be tabulated and analysed manually e.g., the responses on tools for language development. Pre-experiment data will be analysed from 18 August to 30 November 1975. Post-experiment data on language development will be analysed during April-July 1976. The remaining data will be punched on cards and put through the computer at Ahmedabad.